ENVIRONMENTAL ASSESSMENT

Reducing Pigeon, Starling, House Sparrow, Blackbird, and Crow Damage
through an
Integrated Wildlife Damage Management Program
in the
State of New York

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SUMMARY OF PROPOSED ACTION

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) proposes to continue the current bird damage management program that responds to feral pigeon (*Columbia livia*), European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus)*, blackbird {red-winged blackbird (*Agelaius phoeniceus*)}, brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*)}, American crow (*Corvus brachyrhynchos*), and fish crow (*Corvus ossifragus*) damage in the State of New York. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce damage activities to property, agricultural and natural resources, livestock, and public health and safety. Damage management would be conducted on public and private property in New York when the resource owner (property owner) or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using: shooting, trapping, and registered pesticides. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy.

The proposed program would be conducted pursuant to applicable laws and regulations authorizing take of feral pigeons, European starlings, English sparrows, blackbirds (red-winged blackbird, brown-headed cowbird, common grackle), American crows, and fish crows, developed through partnerships among WS, U.S. Fish and Wildlife Service (USFWS) and New York State Department of Environmental Conservation (NYSDEC), and as requested by and through coordination with requestors of assistance. All management actions would comply with applicable federal, state, and local laws.

ACRONYMS

ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
BDM	Bird Damage Management
B.O.	Biological Opinion
CBC	Christmas Bird Count
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
INAD	Investigational New Animal Drug
IWDM	Integrated Wildlife Damage Management
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notices of Availability
NWHC	National Wildlife Health Center
NWRC	National Wildlife Research Center
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
RPA	Reasonable and Prudent Alternative
RPM	Reasonable and Prudent Measure
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TGE	Transmissible Gastroenteritis
TB	Tuberculosis
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
WNV	West Nile virus
WS	Wildlife Services
WSNY	Wildlife Services New York

NOTE: On August 1, 1997, the Animal Damage Control program was officially renamed to Wildlife Services. The terms Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this Environmental Assessment.

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with wildlife which increases the potential for conflicting human/wildlife interactions. In addition, segments of the public desire protection for all wildlife; this protection can create localized conflicts between human and wildlife activities. The *Animal Damage Control Programmatic Final Environmental Impact Statement* (EIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way {United States Department of Agriculture (USDA) 1997}:

> "*Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic benefits . . . and the mere knowledge that wildlife exists is a positive benefit to many people. However . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and value is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well.*"

Wildlife damage management is the science of reducing damage or other problems caused by wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1990). The USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program (formerly known as Animal Damage Control) uses an Integrated Wildlife Damage Management (IWDM) approach, known as Integrated Pest Management (WS Directive 2.105[1]), in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1:1-7 of USDA (1997). These methods may include alteration of cultural practices and habitat and behavioral modification to prevent or reduce damage. The reduction of wildlife damage may also require that local populations be reduced through lethal means.

This environmental assessment (EA) documents the analysis of the potential environmental effects of a proposed feral pigeon (*Columbia livia*), European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus)*, blackbird {red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*)}, American crow (*Corvus brachyrhynchos*), and fish crow (*Corvus ossifragus*) bird damage management (BDM) program. This analysis relies mainly on existing data contained in published documents (Appendix A), including the *Animal Damage Control Program Final Environmental Impact Statement* (USDA 1997). The final environmental impact statement (USDA 1997) may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

WS is the federal agency directed by law and authorized to protect American resources from damage associated with wildlife (Act of March 2, 1931, as amended 46 Stat. 1486; (7 USC. 426-426c) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, Public law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 USC 426C)) and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767). To fulfill this Congressional direction, WS activities are conducted to prevent or reduce wildlife damage caused to agricultural, industrial and natural resources, property, livestock, and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, private organizations, and individuals. Therefore, wildlife damage management is not based on punishing offending animals but as one means of reducing damage and is used as part of the WS Decision Model (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to resources or the public.

Normally, according to the APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions could be categorically excluded {7 CFR 372.5(c), 60 Fed. Reg. 6,000 -6,003, (1995)}. WS has decided in this case to prepare this EA to facilitate planning, interagency

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[1] WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed and planned damage management program. All wildlife damage management that would take place in New York would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA). Notice of the availability of this document will be published in newspapers, consistent with the agency's NEPA procedures.

WS is a cooperatively funded, service-oriented program that receives requests for assistance from private and public entities, including other governmental agencies. Before any wildlife damage management is conducted, Cooperative Agreements, Agreements for Control or other comparable documents are in place. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently according to applicable federal, state and local laws and Memorandums of Understanding (MOUs) between WS and other agencies. WS' mission, developed through its strategic planning process, is

> 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and*
>
> *2) to safeguard public health and safety."*

WS' Policy Manual reflects this mission and provides guidance for engaging in wildlife damage management through:

- Training of wildlife damage management professionals;
- Development and improvement of strategies to reduce losses and threats to humans from wildlife;
- Collection, evaluation, and dissemination of management information;
- Informing and educating the public on how to reduce wildlife damage;
- Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989)

1.1 PURPOSE

The scope and purpose of this EA is to address and evaluate the potential impact to the human environment from the implementation of a WS BDM program to protect agricultural and natural resources, property, livestock, and public health and safety in New York. Damage problems can occur throughout the State, resulting in requests for WS assistance. Under the Proposed Action, BDM could be conducted on private, federal, state, tribal, county, and municipal lands in New York upon request.

1.1.1 Summary of Proposed Action

Wildlife Services proposes to continue the current bird damage management program that responds to feral pigeon, European starling, English sparrow, blackbird (red-winged blackbird, brown-headed cowbird, and common grackle), American crow, and fish crow damage management program in the State of New York. An IWDM approach would be implemented to reduce damage activities to property, agricultural and natural resources, livestock, and public health and safety. Damage management would be conducted on public and private property in New York when the resource owner (property owner) or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment {also called an integrated bird damage management (BDM) strategy throughout this document}. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using: shooting, trapping, and registered pesticides. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of

non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy.

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1.2 NEED FOR ACTION

Conflicts between humans and wildlife are common in New York. The need for action in New York is based on the necessity for a program to protect agricultural, property, livestock, and human health and safety from pigeon, starling, sparrow, blackbird, crow, and fish crow damage, as populations of these species can have a negative economic impact in New York. Comprehensive surveys of pigeon, starling, sparrow, blackbird, crow, and fish crow damage in New York have not been conducted. However, New York WS compiled estimates of the types of damage or public health and safety risks perceived by property and resource owners or managers who requested WS assistance. Requests for WS Technical Assistance for FY98 through FY02 are summarized (Table 1-3). These data represent only a portion of the total damage caused by pigeons, starlings, sparrows, blackbirds, crows, and fish crows, because not all people who experience damage request assistance from WS. A description of the WS Technical Assistance program in NY is described in Chapter 3 or this EA.

1.2.1 Need for Bird Damage Management to Protect Human Health and Safety

Feral domestic pigeons, English sparrows, blackbirds, and European starlings have been suspected in the transmission of 29 different diseases to humans (Davis et al. 1971, Stickley and Weeks 1985, and Weber 1979). These include viral diseases such as meningitis and seven different forms of encephalitis; bacterial diseases such as erysipeloid, salmonellosis, paratyphoid, Pasteurellosis, and Listeriosis; mycotic (fungal) diseases such as aspergillosis, blastomycosis, candidiasis, cryptococcosis, histoplasmosis, and sarcosporidiosis; protozoal diseases such as American trypansomiasis and toxoplasmosis; and rickettsial/chlamydial diseases such as chlamydiosis and Q fever. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, European starlings, and English sparrows (Weber 1979). Table 1-1 shows the more typical diseases affecting humans that can be transmitted by pigeons, English sparrows, and European starlings. In most cases, in which human health concerns are a major reason for requesting BDM, no actual cases of bird transmission of disease to humans have been proven to occur. Thus, it is the risk of disease transmission that is the primary reason for requesting and conducting BDM. Situations in New York where the threat of disease associated with European starling, feral domestic pigeon, or English sparrow populations might include, but are not limited to:

- exposure by residents to a European starling roost which has been in a residential area for more than three years;
- disturbance of a large deposit of droppings in an attic where a flock of feral domestic pigeons routinely roosts or nests;
- accumulated droppings from roosting European starlings, feral domestic pigeons, or English sparrows on structures at an industrial site where employees must work in areas of accumulation
- English sparrows or European starlings nesting or loafing around a food court area of a recreational facility or other site where humans eat in close proximity to concentrated numbers of these birds.

Large fall and winter roosts of crows may cause serious problems in some areas, particularly when located in towns or on other sites located near people. Such roosts are objectionable because of the odor of the bird droppings, health concerns, noise, and damage to trees in the roost. In New York, crows form large

communal roosts of the kind associated with disease organisms which grow in soils enriched by bird excrement, such as *Histoplasma capsulatum* (Weeks and Stickley 1984, Johnson 1994). Sometimes, such roosts occur in urban environments. Public health officials and residents at such sites express concerns for human health related to the potential for disease transmission where dropping deposits accumulate. WS may receive requests for assistance in resolving problems related to large urban crow roosts in New York.

Many times, individuals or property owners that request assistance with feral domestic pigeon, crow, or nuisance blackbird or European starling roost problems are concerned about potential disease risks but are unaware of the types of diseases that can be associated with these birds. In most such situations, BDM is requested because the mess associated with droppings left by concentrations of birds is aesthetically displeasing and can result in continual clean-up costs. Under the proposed action, WS could agree to assist in resolving these types of problems.

Table 1-1. Diseases transmissible to humans and livestock that are associated with feral domestic pigeons, European starlings, and English sparrows. Information from Weber (1979).

Disease	Human Symptoms	Potential for Human Fatality	Effects on Domestic Animals
Bacterial:			
Erysipeloid	skin eruption with pain, itching; headaches, chills, joint pain, prostration, fever, vomiting	sometimes - particularly to young children, old or infirm people	serious hazard for the swine industry
Salmonellosis	gastroenteritis, septicaemia, persistent infection	possible, especially in individuals weakened by other disease or old age	causes abortions in mature cattle, possible mortality in calves, decrease in milk production in dairy cattle
Pasteurellosis	respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	rarely	may fatally affect chickens, turkeys and other fowl
Listeriosis	conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	sometimes - particularly with newborns	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles
Viral:			
Meningitis	inflammation of membranes covering the brain, dizziness, and nervous movements	possible — can also result as a secondary infection with listeriosis, salmonellosis, cryptococcosis	causes middle ear infection in swine, dogs, and cats
Encephalitis (7 forms)	headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	mortality rate for eastern equine encephalomyelitis may be around 60%	may cause mental retardation, convulsions and paralysis
Mycotic (fungal):			
Aspergillosis	affects lungs and broken skin, toxins poison blood, nerves, and body cells	not usually	causes abortions in cattle
Blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	rarely	affects horses, dogs and cats
Candidiasis	infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	rarely	causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle

Cryptococcosis	lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	possible especially with meningitis	chronic mastitis in cattle, decreased milk flow and appetite loss
Histoplasmosis	pulmonary or respiratory disease. May affect vision	possible, especially in infants and young children or if disease disseminates to the blood and bone marrow	actively grows and multiplies in soil and remains active long after birds have departed
Protozoal:			
American Trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on pigeons
Toxoplasmosis	inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	possible	may cause abortion or still birth in humans, mental retardation
Rickettsial / Chlamydial:			
Chlamydiosis	pneumonia, flu-like respiratory infection, high fever, chills, loss of appetite, cough, severe headaches, generalized aches and pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	occasionally, restricted to old, weak or those with concurrent diseases	in cattle, may result in abortion, arthritis, conjunctivitis, and enteritis
Q Fever	sudden pneumonitis, chills, fever, weakness, severe sweating, chest pain, severe headaches and sore eyes	possible	may cause abortions in sheep and goats

1.2.2 Need for Bird Damage Management at Airports

The risk that birds pose to aircraft is well documented with the worst case reported in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of European starlings (Terres 1980). Other examples include:

- In February, 1973, a Learjet 24 departing Peachtree-Dekalb Airport (Atlanta, GA) struck a flock of brown-headed cowbirds attracted to a nearby trash-transfer station. Engine failure resulted in a crash, and the deaths of 8 people (Wright 2003).

- In 1990, a departing CL-600 struck a flock of common grackles at the Westchester County Airport in White Plains, NY causing the pilot to abort take-off. Fan blades were replaced in one engine, and damages were assessed at $15,000 (FAA National Wildlife Strike Database).

- In 1997, a McDonnell Douglas 80 struck over 400 blackbirds just after takeoff from Dallas-Fort Worth Airport. Nearly every part of the plane was hit. The pilot declared an emergency and returned to land. The number 1 engine had to be replaced, and damage to the plane was substantial. The cost of repairs was about $219,000 (USGAO 2001).

- In 1999, a Boeing 757 struck a flock of European starlings at the Cincinnati/Northern Kentucky International Airport and was forced to abort the flight (NTSB 1999). Damages were assessed at more than $500,000 by airport officials (D.T. Little, WS Pers. Comm. 1999).

- In 2003, a B737-300 departing from the Greater Rochester International Airport in Rochester, NY struck a flock of European starlings, causing substantial damage. All fan

blades were replaced and the engine was serviced. Total damages were assessed at approximately $200,000 (FAA National Wildlife Strike Database).

Flocks of starlings and blackbirds may intersect aircraft flight lines upon entering or exiting a winter roost at or near airports, and present a safety threat to aviation. Starlings and blackbirds are a particularly dangerous bird to aircraft operations because of their high body density and tendency to travel in large flocks of hundreds to thousands of birds (Seamans et al. 1995).

Generally, bird collisions occur when aircraft are near the ground. From 1990-2002, approximately 55% of reported bird strikes occurred when the aircraft was at an altitude of 100 feet above ground level or less. Additionally, 78% occurred less than 1,000 feet above ground level and about 86% occurred less than 2,000 feet above ground level (Cleary et al. 2003). From 1990-2002, birds were involved in more than 97% of the reported wildlife strikes to civil aircraft in the USA (Cleary et al. 2003). From 1990-2002, reported losses from bird strikes totaled 211,928 hours of aircraft down time and $140.9 million in monetary losses (Cleary et al. 2003).

According to the Federal Aviation Administration's (FAA) National Wildlife Strike Database, of the bird species identified in wildlife strikes, pigeons, starlings, sparrows, blackbirds, and crows accounted for a combined 9.8% of all bird strikes in the U.S. (Cleary et al. 2000). More than 3,200 wildlife strikes were reported to the FAA for New York from May 1990 through July 2004, and 11.6% of these strikes were identified as pigeons, sparrows, blackbirds, European starlings or crows (FAA National Wildlife Strike Database). Of these strikes, 161 involved starlings or blackbirds. In reality, this number is likely to be greater as an estimated 80% of civil bird strikes goes unreported (Barras and Dolbeer 2000).

WS receives requests annually for assistance regarding bird damage management at airports in New York. These requests are considered serious because of the potential for loss of human life and because damage to aircraft can be extremely expensive. With the implementation of an Integrated BDM program in New York, WS could provide direct management and technical assistance at the request of any aviation facility in the State.

1.2.3 Need for Bird Damage Management at Cattle Feeding and Dairy Cattle Facilities

Blackbirds, European starlings, English sparrows, and, to a lesser extent, feral domestic pigeons and crows often cause damage at cattle feeding facilities and dairies by congregating in large numbers to feed on the grain component of cattle feed. Such feeding strategies present disease threats to livestock at such sites. The birds also cause damage by defecating on fences, shade canopies, and other structures, which can accelerate corrosion of metal components and which generally is considered an unsightly nuisance and potential health hazard for the feedlot/dairy operators and their personnel. In some situations, large flocks of crows may become a factor in spreading disease. At times, they feed in and around farm buildings, where they have been implicated in the spread of transmissible gastroenteritis (TGE) among swine facilities

Scope of Livestock Feed Losses. The problem of starling damage to livestock feed has been documented in France and Great Britain (Feare 1984), and in the United States (Besser et al. 1968). The concentration of larger numbers of cattle eating huge quantities of feed in confined pens results in a tremendous attraction to European starlings, blackbirds, and feral domestic pigeons. Diet rations for cattle contain all of the nutrients and fiber that cattle need, and are so thoroughly mixed that cattle are unable to select any single component over others. The basic constituent of most rations is silage and the high energy portion is usually provided as barley, which may be incorporated as whole grain or crushed or ground cereal. While cattle cannot select individual ingredients from that ration, European starlings can and do select the barley, thereby altering the energetic value of the complete diet. The removal of this high energy fraction by European starlings is believed to reduce milk yields, weight gains, and is economically critical (Feare 1984). Glahn and Otis (1986) reported that starling damage was also associated with proximity to roosts, snow, and freezing temperatures and the number of livestock on feed.

The economic significance of feed losses to European starlings has been demonstrated by Besser et al. (1968) who concluded that the value of losses in feedlots near Denver, Colorado was $84 per 1,000 birds in 1967. Forbes (1995) reported European starlings consume up to 50% of their body weight in feed each

day. Glahn and Otis (1981) reported losses of 4.8 kg of pelletized feed consumed per 1,000 bird minutes. Glahn (1983) reported that 25.8% of farms in Tennessee experienced starling depredation problems of which 6.3% experienced considerable economic loss. Williams (1983) estimated seasonal feed losses to five species of blackbirds (primarily brown-headed cowbirds) at one feedlot in south Texas at nearly 140 tons valued at $18,000.

Scope of Livestock Health Problems. A number of diseases that affect livestock have been associated with feral domestic pigeons, European starlings, blackbirds, and English sparrows (Weber 1979); Table 1-2 shows the more typical diseases of livestock that have been transmitted by pigeons, English sparrows, blackbirds, and/or European starlings. Transmission of diseases such as Transmissible Gastroenteritis Virus (TGE), Tuberculosis (TB), and Coccidiosis to livestock has been linked to migratory flocks of European starlings and blackbirds. Estimates of the dollar value of this type of damage are not available. A consulting veterinarian for a large cattle feeding facility in Texas indicated problems associated with coccidiosis declined following reduction of starling and blackbird numbers using the facility (R. Smith, WS, Canyon District, TX, Pers. Comm.).

Table 1-2. Diseases of livestock that have been linked to feral domestic pigeons, European starlings, blackbirds, and/or English sparrows. Information from Weber (1979).

Disease	Livestock affected	Symptoms	Comments
Bacterial:			
Erysipeloid	cattle, swine, horses, sheep, goats, chickens, turkeys, ducks	Pigs - arthritis, skin lesions, necrosis, septicemia Sheep - lameness	serious hazard for the swine industry, rejection of swine meat at slaughter due to septicemia, also affects dogs
Salmonellosis	all domestic animals	abortions in mature cattle, mortality in calves, decrease in milk production in dairy cattle Colitis in pigs,	over 1,700 serotypes
Pasteurellosis	cattle, swine, horses, rabbits, chickens, turkeys	Chickens and turkeys die suddenly without illness pneumonia, bovine mastitis, abortions in swine, septicemia, abscesses	also affects cats and dogs
Avian Tuberculosis	chickens, turkeys, swine, cattle, horses, sheep	Emaciation, decrease in egg production, and death in poultry. Mastitis in cattle	also affects dogs and cats
Streptococcosis	cattle, swine, sheep, horses, chickens, turkeys, geese, ducks, rabbits	Emaciation and death in poultry. Mastitis in cattle, abscesses and inflammation of the heart , and death in swine	feral pigeons are susceptible and aid in transmission
Yersinosis	cattle, sheep, goats, horses, turkeys, chickens, ducks	abortion in sheep and cattle	also affects dogs and cats
Vibriosis	cattle and sheep	In cattle, often a cause of infertility or early embryonic death. In sheep, the only known cause of infectious	of great economic importance

		abortion in late pregnancy	
Listeriosis	Chickens, ducks, geese, cattle, horses, swine, sheep, goats	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles	also affects cats and dogs
Viral:			
Meningitis	cattle, sheep, swine, poultry	inflammation of the brain, newborn calves unable to suckle	associated with listeriosis, salmonellosis, cryptococcosis
Encephalitis (7 forms)	horses, turkeys, ducks	drowsiness, inflammation of the brain	mosquitoes serve as vectors
Mycotic (fungal):			
Aspergillosis	cattle, chickens, turkeys, and ducks	abortions in cattle	common in turkey poults
Blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	Rarely	affects horses, dogs and cats
Candidiasis	cattle, swine, sheep, horses, chickens, turkeys	In cattle, mastitis, diarrhea, vaginal discharge, and aborted fetuses	causes unsatisfactory growth in chickens
Cryptococcosis	cattle, swine, horses	chronic mastitis in cattle, decreased milk flow and appetite loss	also affects dogs and cats
Histoplasmosis	horses cattle and swine	(in dogs) chronic cough, loss of appetite, weakness, depression, diarrhea, extreme weight loss	also affects dogs; actively grows and multiplies in soil and remains active long after birds have departed
Coccidiosis	poultry, cattle, and sheep	bloody diarrhea in chickens, dehydration, retardation of growth	almost always present in English sparrows; also found in pigeons and European starlings
Protozoal:			
American Trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on pigeons
Toxoplasmosis	cattle, swine, horses, sheep, chickens, turkeys	In cattle, muscular tremors, coughing, sneezing, nasal discharge, frothing at the mouth, prostration and abortion	also affects dogs and cats
Rickettsial/ Chlamydial:			
Chlamydiosis	cattle, horses, swine, sheep, goats, chickens, turkeys, ducks, geese	In cattle, abortion, arthritis, conjunctivitis, enteritis	also affects dogs and cats and many wild birds and mammals
Q Fever	affects cattle, sheep, goats, and poultry	may cause abortions in sheep and goats	can be transmitted by infected ticks

1.2.4 Need for Bird Damage Management Related to Agricultural Crops

The State of New York reported an estimated 37,500 farms in 2001, with about 7.6 million acres in cropland (NY Agricultural Statistics Service 2003). Cash receipts for 2001 totaled $3.41 billion. Cash receipts for livestock and poultry totaled $2.22 billion, while dairy totaled $1.84 billion. Field crops, fruits, and vegetables totaled close to $1.2 billion. New York ranks 3rd in the nation in dairy production and 6th in the nation in value of both fresh market fruits and vegetables (NY Agricultural Statistics Service 2003).

Bird damage to crops has occasionally been identified as a problem in this State. Several studies have shown that blackbirds and European starlings can pose a great economic threat to agricultural producers (Besser et al. 1968, Dolbeer et al. 1978 and Feare 1984). Fruit, corn, and grain crops can be severely damaged by blackbirds, European starlings, English sparrows, American crows, and fish crows. Sparrows damage crops by pecking seeds, seedlings, buds, flowers, vegetables, and maturing fruits (Fitzwater 1994). Crows may damage seedling corn plants by pulling the sprouts and consuming the kernels. At times they damage ripening corn during the milk and dough stages of development. They feed on strawberry crops, thus contaminating the crops with their droppings. In addition, birds can kill vegetation, and spread disease to livestock through droppings and contaminated drinking water (Weber 1979).

1.2.5 Need for Bird Damage Management to Protect Property

Birds frequently damage structures on private property, or public facilities, with fecal contamination. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). Corrosion damage to metal structures and painted finishes, including those on automobiles, can occur because of uric acid from bird droppings. Electrical utility companies frequently have problems with birds causing power outages by shorting out transformers and substations. Pigeon droppings deface and accelerate the deterioration of buildings and increase the cost of maintenance. Large amounts of droppings may kill vegetation and produce an objectionable odor. Pigeon manure deposited on park benches, statues, cars, and unwary pedestrians is aesthetically displeasing (Williams and Corrigan 1994). Persons and businesses concerned about these types of damage may request WS assistance.

Pigeons, starlings, and sparrows cause economic damage to aircraft in hangars. Accumulation of fecal droppings on planes, helicopters, maintenance equipment, and hangar floors results in unscheduled maintenance to clean planes and buildings to protect painted surfaces from acidic fecal droppings and maintain a sanitary work environment. Furthermore, birds may build nests in engines of idle aircraft which may cause engine damage or cause a fire.

1.2.6 Need for Bird Damage Management to Protect Wildlife, including T&E Species

Some wildlife species, including species listed as threatened or endangered under the ESA of 1973, are preyed upon or otherwise adversely affected by certain bird species. For instance, brood parasitism by brown-headed cowbirds has become a concern for many wildlife professionals where these birds are plentiful. Inter-specific nest competition has been well documented in brown-headed cowbirds. The brown- headed cowbird may function most prominently in negatively impacting other bird species. These birds successfully parasitize the nests of songbirds, laying 1 or sometimes 2 eggs per host nest and laying up to 25 or more eggs per nesting season (Dolbeer 1994). The brown-headed cowbird is a species that is known to parasitize the nests of at least 158 avian species (Friedman 1929) and is thought to be responsible for the decline in populations of many species of resident and migrant birds. With endangered bird species, such parasitism may cause enough nest failures to jeopardize the host species.

Interspecific nest competition has been well documented in European starlings. Miller (1975) and Barnes (1991) reported European starlings were responsible for a severe depletion of the eastern bluebird (*Sialis sialis*) population due to nest competition. House sparrows also compete with bluebirds. Nest competition by European starlings has been known to adversely impact American kestrels (sparrow hawks) (Von Jarchow 1943, Nickell 1967, and Wilmer 1987), red-bellied woodpeckers (*Centurus carolinus*), Gila woodpeckers (Centurus uropygialis) (Kerpez et.al. 1990 and Ingold 1994), and wood ducks (*Aix sponsa*) (Shake 1967, McGilvery and Uhler 1971, Heusmann et.al. 1977, and Grabill 1977). Weitzel (1988)

reported nine native species of birds in Nevada had been displaced by starling nest competition, and Mason et al. (1972) reported European starlings evicting bats from nursery spaces.

At times, large flocks of crows near wetland areas may increase the potential for spread of waterfowl diseases, such as avian cholera. The scavenging habits of crows, and the apparent lengthy incubation time of the disease in these birds, are factors that increase the potential for crows to spread this devastating disease.

1.2.7 Need for Roost Management of Urban Crows

During the last 30 years, crows throughout the United States have been shifting their winter roosting sites from rural areas to more urban environments (Gorenzel et al. 2000). As a result, WS has received an increasing number of inquiries and complaints from city governments and citizens regarding urban winter crow roosts. Crow roosts form in late fall and, if left undisturbed, persist until late winter. Local residents and public officials are concerned about noise, accumulation of crow droppings, strong odors, property damage, clean-up costs, and the perceived threat of disease.

Since 1998, Wildlife Services has been working with cities throughout New York State to address these concerns by dispersing urban and suburban crow roosts to more rural locations. During these roost dispersal efforts, WS has used nonlethal hazing techniques (distress calls, pyrotechnics, and lasers) to relocate up to 40,000 birds from an individual roost site (Chipman et al. 2003. In the future WS expects to work with roosts as large as or larger than 60,000 individual birds.

1.2.8 Need for Bird Management at Landfills

WS has worked at three landfills throughout New York to manage crows and starling damage. Bird conflicts at these landfills include the accumulation of feces on equipment and buildings, distraction of machine operators, and the potential for transmission of disease to workers on site. There also exist landowner concerns from surrounding industrial and residential areas associated with birds loafing and defecating on property or carrying garbage and other waste material off site. Another important objective is to assist a landfill in complying with State regulation 6NYCRR Part 360-1.14(1) which requires the facility to "be maintained so as to prevent or control on site population of vectors."

The landfill of most prominence was the Fresh Kills Landfill on Staten Island, NY where the debris from the World Trade Center attack was taken to be sorted for evidence (Chipman et al. 2004). At this landfill, WS responded to an emergency situation to prevent birds such as crows and gulls from impacting the recovery of evidence and identification of victims. During a 10-month period from September 2001 to June 2002 WS deployed over 23,000 pyrotechnics and dispersed over 5,000 crows and 172,000 gulls.

At landfills, WS employs both lethal and non-lethal techniques to manage bird damage. Since WS began working with landfills in 1994 787,984 American crows and 7,519,925 European starlings have been harassed, whereas 1,395 American crows and 25,197 European starlings have been killed.

1.3 WS RECORD KEEPING REGARDING REQUESTS FOR BIRD DAMAGE MANAGEMENT ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data is limited to information that is collected from people who have requested services or information from Wildlife Services. It does not include requests received or responded to by local, State, or other Federal agencies and it is not a complete database for all wildlife damage occurrences. The number of requests for assistance does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exist.

The database includes, but is not limited to, the following information: species of wildlife involved; the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection.

Table 1-3. Number of BDM technical assistance projects involving feral pigeons, European starlings, English sparrows, blackbirds (including red-winged blackbirds, brown-headed cowbirds, and common grackles), American crows, and fish crows for New York Wildlife Services from FY 1998-2002 (WS MIS Data, unpublished reports).*

	Resource Protected				
Fiscal Year	Agriculture	Property	Health & Safety	Natural Resources	Total
1998	3	16	5	0	24
1999	5	25	4	0	34
2000	0	25	2	0	27
2001	0	10	686	0	696
2002	28	26	3097	1	3152
Total	36	102	3794	1	3933

* Data presented in this table were taken from NY WS Annual Program Reports and represent the number of technical assistance projects conducted by the NY WS program and do not include data from operational projects conducted during the time period covered.

1.4 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

WS conducted a NEPA process and developed a Final Environmental Impact Statement (FEIS) on the national APHIS/WS program (USDA 1997). The FEIS contains detailed discussions of potential environmental impacts from various wildlife damage management methods. Pertinent information available in the FEIS has been incorporated by reference into this EA. The FEIS may be obtained by contacting: USDA APHIS WS Operational Support Staff, 4700 River Rd., Unit 87, Riverdale, MD 20737-1234.

1.5 DECISIONS TO BE MADE

Based on the scope of this EA, the decisions to be made are:

- Should WS implement an integrated bird damage management strategy, including technical assistance and direct control, to meet the need for bird damage management in New York?
- If not, how should WS fulfill its legislative responsibilities for management of damage and conflicts associated with feral pigeons, European starlings, house sparrows, blackbirds, American crows, and fish crows in New York?
- Might the proposed action have significant impacts on the quality of the human environment, requiring preparation of an EIS?

1.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.6.1 Actions Analyzed

This EA evaluates bird damage management by WS to protect: 1) property, 2) agricultural and natural resources, 3) livestock and dairies, and 4) public health and safety in New York. Protection of other resources or other program activities would be addressed in other NEPA analysis, as appropriate.

1.6.2 American Indian Lands and Tribes

Currently WS does not have any Memorandums of Understanding (MOU) or signed agreements with any American Indian tribe in New York. If WS enters into an agreement with a tribe, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA.

1.6.3 Period for which this EA is Valid

This EA would remain valid until the WS program in New York and other appropriate agencies determine that new needs for action, changed conditions, or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be supplemented pursuant to NEPA. Review of this EA would be conducted each year to ensure that the EA is sufficient.

1.6.4 Site Specificity

This EA analyzes the potential impacts of BDM and addresses activities on all lands in New York under MOUs, Cooperative Agreements, and in cooperation with the appropriate public land management agencies. It also addresses the impacts of BDM in areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional BDM efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the management of bird damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, etc. Although some of the sites where bird damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever bird damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in New York (see Chapter 3 for a description of the Decision Model and its application).

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within the analysis area. In this way, APHIS-WS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission.

1.6.5 Summary of Public Involvement

Issues related to the proposed action were initially developed by WS. Issues were defined and preliminary alternatives were identified. As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS-NEPA implementing regulations, this document and its Decision are being made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA and its Decision should be revisited and, if appropriate, revised.

1.7 AUTHORITY AND COMPLIANCE

1.7.1 Authority of Federal and State Agencies in BDM in New York

See Chapter 1 of USDA (1997) for a complete discussion of federal laws pertaining to WS.

Wildlife Services Legislative Authority.

The USDA is directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services program is the Act of 1931, as amended (7 U.S.C. 426-426c; 46 Stat. 1468); the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (P.L. 100202); and the Agriculture, Rural Development, Food and Drug

Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767), which provides that:

> *"The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."*

Since 1931, with the changes in societal values, WS policies and its programs place greater emphasis on the part of the Act discussing "bringing (damage) under control", rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative directive and authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

> *"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammals and birds species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."*

U.S. Fish and Wildlife Service (USFWS).

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the MBTA and those that are listed as T&E species under the ESA. Under the permitting application process, the USFWS requires applicants to describe prior non-lethal damage management techniques that have been used.

The USFWS authority for action is based on the MBTA of 1918 (as amended), which implements treaties with the United States, Great Britain (for Canada), the United Mexican States, Japan, and the Soviet Union. Section 3 of this Act authorized the Secretary of Agriculture:

"From time to time, having due regard to the zones of temperature and distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the convention to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations, which regulations shall become effective when approved by the President."

The authority of the Secretary of Agriculture, with respect to the Migratory Bird Treaty, was transferred to the Secretary of the Interior in 1939 pursuant to Reorganization Plan No. II. Section 4(f), 4 Fed. Reg. 2731, 53 Stat. 1433. However, starlings, house sparrows, and pigeons are not protected under the Migratory Bird Treaty Act.

CFR 50 Subchapter C - The National Wildlife Refuge System - Part 30 - Feral Animals - Subpart B-30.11 - Control of feral animals states: (a) Feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized federal or state personnel or by private persons operating under permit in accordance with applicable provisions of federal or state law or regulation.

New York State Department of Environmental Conservation (NYSDEC), Division of Fish, Wildlife and Marine Resources.

The New York State Department of Environmental Conservation was established by chapter 140 of the New York State Laws of 1970 and is continued under the current laws. The mission of the NYSDEC, as

stated in Section 1-0101 of the New York State Environmental Conservation Law (ECL), is to "conserve, improve, and protect its natural resources and environment, and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the State and their overall economic and social well being." NYSDEC is authorized to manage wildlife resources for the state under TITLE 3— GENERAL POWERS AND DUTIES OF THE DEPARTMENT. NYSDEC is responsible for the management of the natural population of birds in New York (ECL Sections 11-0105 and 11-0305 Paragraph 10). No license or permit from NYSDEC is required for any taking of destructive wildlife authorized by ECL Section 11-0523. Included under this authorized taking are starlings, common crows, pigeons, and, during certain months of the year, blackbirds (i.e., red-winged blackbirds, common grackles and cowbirds). The exception is within New York City where pigeon control is regulated by the New York City Department of Health (ECL Section 11-0513).

The NYSDEC is the agency responsible for administering and enforcing New York State Pesticide laws. Article 33 of the ECL provides the general framework for the distribution, sale, use and transportation of pesticides in New York. New York State pesticide regulations are found in Title 6 of the New York State Code of Rules and Regulations (6 NYCRR) Parts 320-329. Part 325 contains regulations on the application of pesticides, including commercial and private pesticide applicator certification requirements and pesticide business registration. Pesticide restrictions are listed in Part 326; some pesticides that the EPA considers to be general use are classified as restricted use in New York State by the DEC.

Authority of Federal Agencies in Wildlife Damage Management in New York.

Through the Memorandum of Understanding among Cornell Cooperative Extension, NY Department of Agriculture and Markets, NY Department of Environmental Conservation, NY Department of Health, and U.S. Department of Agriculture, Wildlife Services has established a cooperative relationship among these agencies. This MOU authorizes WS "to reduce or control wildlife species detrimental to agriculture, public health and safety, or property" after consultation with the NYSDEC. WS is obligated to conduct control activities under the applicable Federal, State, and local laws and regulations.

WS New York operates under a current New York State Fish and Wildlife License, number LCP04-520. This permit authorizes WS to "collect, take, and/or kill, possess, band/mark/tag, transport and release wildlife in the performance of the licensee's duties as state director, USDA, APHIS/Wildlife Services, as provided and authorized under federal regulations." This permit excludes the killing, collection, or possession of endangered/threatened species. In addition, the NYSDEC will issue permits to private individuals for the lethal control of birds under the authority of ECL Section 11-0521.

1.7.2 Compliance with Other Federal Laws

Several other federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act. Environmental documents pursuant to NEPA must be completed before operational activities consistent with the NEPA decision can be implemented. This EA meets the NEPA requirement for the proposed action in New York. When WS direct management assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS could agree to complete NEPA documentation at the request of the other federal agency. WS also coordinates specific projects and programs with other agencies. The purpose of these contacts is to coordinate any wildlife damage management that may affect resources managed by these agencies or affect other areas of mutual concern.

Endangered Species Act. It is federal policy, under the ESA, that all federal agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the Act (Sec. 2(c)). WS conducts Section 7 consultations with the United States Fish and Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that "any action authorized, funded or carried out by such an agency... is not likely to jeopardize the continued existence of any endangered or threatened species . . . each agency shall use the best scientific and commercial data available" (Sec.

7(a)(2)). WS obtained a Biological Opinion (B.O.) from the USFWS describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F).

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711; 40 Stat. 755), as Amended. The MBTA provides the USFWS regulatory authority to protect families of birds that contain species which migrate outside the United States. The law prohibits any "*take*" of these species by any entities, except as permitted by the USFWS; therefore, the USFWS issues permits to requesters for reducing bird damage.

European starlings, feral domestic pigeons, and English sparrows are not classified as protected migratory birds and therefore have no protection under this Act. USFWS depredation permits are also not required to kill yellow-headed, red-winged, rusty, and Brewer's blackbirds, cowbirds, all grackles, crows, and magpies found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance (50 CFR 21.43).

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The U.S. Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into the WS program in New York are registered with and regulated by the EPA and NYSDEC, and used by WS in compliance with labeling procedures and requirements.

Investigational New Animal Drug (INAD). The drug Alpha-Chloralose (AC) has been used as a sedative for animals and is registered with the Food and Drug Administration (FDA) to capture waterfowl, coots, and pigeons. FDA approval for use under INAD (21 CFR, Part 511) authorized WS to use the drug as a non-lethal form of capture. AC is not registered for use in New York at this time but is analyzed in this document for potential future use if this chemical becomes registered in New York.

Executive Order 13112 of February 3, 1999. This Order prevents the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that invasive species cause. Pigeons, starlings, and English sparrows are recognized as invasive species that have adverse economic, ecological, and human health impacts.

Executive Order 13186 of January 10, 2001 "Responsibilities of Federal Agencies to Protect Migratory Birds." This Order states that each federal agency, taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations, is directed to develop and implement, a MOU with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this Order and is currently waiting for USFWS approval. WS will abide by the MOU once it is finalized and signed by both parties.

Occupational Safety and Health Act of 1970. The Occupational Safety and Health Act (OSHA) of 1970 and its implementing regulations (29CFR1910) on sanitation standards states that, "Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected." This standard includes birds that may cause safety and health concerns at workplaces.

The Native American Graves and Repatriation Act of 1990. The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

National Historic Preservation Act (NHPA) of 1966 as amended. The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that has the potential to cause effects on historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the Advisory Council on Historic Preservation (i.e. State Historic Preservation Office, Tribal Historic Preservation

Officers), as appropriate. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties

Each of the BDM methods described in Appendix B that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

There is potential for audible effects on the use and enjoyment of a historic property when methods such as propane exploders, pyrotechnics, firearms, or other noise-making methods are used at or in close proximity to such sites for purposes of hazing or removing nuisance birds or other wildlife. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage or nuisance problem, which means such use would be to benefit the historic property. A built-in mitigating factor for this issue is that virtually all of the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

Environmental Justice and Executive Order 12898 - "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." Executive Order 12898, promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental Justice is a priority within APHIS and WS. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. All chemicals used by WS are regulated by the EPA through FIFRA, NYSDEC, by MOUs with land managing agencies, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997, Appendix P). The WS operational program properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

Protection of Children from Environmental Health and Safety Risks (Executive Order 13045). Children may suffer disproportionately from environmental health and safety risks for many reasons, including their developmental physical and mental status. BDM as proposed in this EA would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action would not increase environmental health or safety risks to children.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.0 INTRODUCTION

Chapter 2 contains a discussion of the issues, including issues that received detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues used to develop mitigation measures and SOPs, and issues not considered in detail, with the rationale. Pertinent portions of the affected environment are included in this chapter and in the discussion of issues used to develop mitigation measures. Additional affected environments are incorporated into the discussion of the environmental impacts in Chapter 4 and the description of the proposed program in Chapter 3.

2.1 AFFECTED ENVIRONMENT

The areas of the proposed action could include, but are not limited to, areas in and around buildings and parks, bridges, industrial sites, urban/suburban woodlots, or at any other sites where birds may roost, loaf, or nest. Damage management activities could be conducted at agricultural fields, vineyards, orchards, farmyards, dairies, ranches, livestock operations, grain mills, and grain handling areas (e.g., railroad yards) where birds destroy crops, feed on spilled grains, or contaminate food products for human or livestock consumption. The area of the proposed action could also include airports and surrounding property where birds represent a threat to aviation safety. Additionally, the area of proposed action could include landfills and surround property where birds represent a threat to human health and safety.

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

- Effects on Target Bird Species
- Effects on Other Wildlife Species, including T&E Species
- Effects on Human Health and Safety
- Impacts to Stakeholders, Including Aesthetics
- Humaneness and Animal Welfare Concerns of Methods Used

2.2.1 Effects on Target Bird Species

A common concern among members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA are feral pigeons (*Columbia livia*), European starlings (*Sturnus vulgaris*), English sparrows (*Passer domesticus)*, blackbirds {red-winged blackbirds (*Agelaius phoeniceus*), brown-headed cowbirds (*Molothrus ater*), and common grackles (*Quiscalus quiscula*)}, fish crows *(Corvus ossifragus)*, and American crows (*Corvus brachyrhynchos*).

Impacts of West Nile virus on bird populations

West Nile virus (WNV) has emerged in recent years in temperate regions of North America, with the first appearance of the virus in North America occurring in New York City in 1999 (MMWR 2002, Rappole et al. 2000). Since 1999 the virus has spread across the United States and was reported to occur in 44 states and the District of Columbia in 2002 (MMWR 2002). West Nile virus is typically transmitted between birds and mosquitoes. Mammals can become infected if bitten by an infected mosquito, but individuals in most species of mammals do not become ill from the virus. The most serious manifestation of WNV is fatal encephalitis in humans, horses, and birds. West Nile virus has been detected in dead bird species of at least 138 species (CDC 2003). Although birds infected with WNV can die or become ill, most infected birds do survive and may subsequently develop immunity to the virus (CDC 2003, Cornell University 2003). In some bird species, particularly Corvids (crows, blue jays, and magpies), the virus causes disease (often fatal) in a large percentage of infected birds (Audubon 2003, CDC 2003, Cornell University 2003, MMWR 2002). In 2002, WNV surveillance/monitoring programs revealed that corvids accounted for 90% of the dead birds reported with crows representing the highest rate of infection (MMWR 2002). Large

birds that live and die near humans (i.e. crows) have a greater likelihood of being discovered, therefore the reporting rates tend to be higher for these bird species and are a "good indicator" species for the presence of WV virus in a specific area (Cornell University 2003, Audubon 2003). According to US Geological Survey (USGS), National Wildlife Health Center (2003), information is not currently available to know whether or not WNV is having an impact on bird populations in North America. USGS states that it is not unusual for a new disease to cause high rates of infection or death because birds do not have the natural immunity to the infection. Furthermore, it is not known how long it will take for specific bird population to develop sufficient immunity to the virus. Surveys of wild birds completed in the last three years have shown that some birds have already acquired antibodies to the virus (USGS-NWHC 2003). Based upon available Christmas Bird Counts and Breeding Bird Surveys, USGS-NWHC (2003) states that there have been declines in observations of many local bird populations, however they do not know if the decline can be attributed to WNV or to some other cause. A review of available crow population data by Audubon (2003) reveals that at least some local crow populations are suffering high WNV related mortality, but crow numbers do not appear to be declining drastically in New York or in the northeastern U.S.

2.2.2 Effects on Other Wildlife Species, Including T&E Species

WS, other wildlife professionals, and the public are concerned about the potential impact of damage management methods and activities on nontarget species, particularly threatened and endangered (T&E) species. WS' standard operating procedures (SOPs) include measures intended to mitigate or reduce the effects on nontarget and T&E species populations and are presented in Chapter 3. To reduce the risks of adverse affects to non-target species, WS would select damage management methods that are target-selective or apply such methods in ways to reduce the likelihood of capturing or killing non-target species.

Threatened and Endangered species lists for the USFWS and State of New York were reviewed to identify potential effects on federal and state listed T&E species. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the Endangered Species Act (ESA) concerning potential effects of BDM methods on T&E species and has obtained a Biological Opinion (B.O.). For the full context of the B.O., see Appendix F of the ADC FEIS (USDA 1997). WS is also in the process of reinitiating Section 7 consultation at the program level to assure that potential effects on T&E species have been adequately addressed. Formal risk assessment (USDA 1997, Appendix P) has also shown that there are no probable risks to T&E species in New York from bird damage control methods.

Some members of the public are concerned that the use of registered toxicants to reduce bird damage would have adverse impacts on other wildlife, including T&E species. Under the alternatives analyzed in this EA, the primary toxicant proposed for use by WS is DRC-1339. DRC-1339 would be used to lethally remove blackbirds, cowbirds, grackles, sparrows, pigeons, and crows in damage situations. Other chemical methods that could be used include Avitrol®, Methyl Anthranilate, Anthraquinone, Mesurol and Starlicide®. Avitrol® is classified as an avian distressing agent and is normally used to deter target bird species from using certain problem areas. Methyl Anthranilate (ReJeX-iT AG-36™) is a bird repellent known for its artificial grape flavoring. The repellents Anthraquinone (FlightControl™) and Mesurol; an avian tranquilizer Alpha-Chloralose; and the avicide Starlicide® are not currently registered for use on most bird species at this time in the State, but are analyzed in this document for potential future use if the chemicals should become registered in New York. Appendix B contains detailed descriptions of these chemicals.

2.2.3 Effects on Human Health and Safety

A common concern is whether the proposed action or any of the alternatives pose an increased threat to human health and safety. In particular, there is concern that lethal methods of bird removal (i.e., pesticide application and shooting) may be hazardous to people and pets, or that continued increases in bird populations might threaten human health or safety. A formal risk assessment (USDA 1997, Appendix P)

has shown that there are no probable risks to human health and safety in New York from WS bird damage management methods.

Safety and efficacy of chemical control methods

The public is sometimes concerned about the chemicals used in bird control programs because of potential adverse effects on people from being exposed either to the chemicals directly or to birds that have been treated with chemicals. Chemical methods that could be used for BDM in New York include DRC-1339, Avitrol®, Methyl Anthranilate, Anthraquinone, Alpha-Chloralose, Mesurol and Starlicide®.

Under the alternatives analyzed in this EA, the primary toxicant proposed for use by WS is **DRC-1339**. DRC-1339 would be used to lethally remove blackbirds, cowbirds, grackles, sparrows, pigeons, and crows in damage situations. Use of DRC-1339 is regulated by the EPA through FIFRA, as well as by WS Directives and by New York Pesticide Control Laws. It is classified as a restricted use pesticide. Currently DRC-1339 has 4 EPA-registered pesticide use labels: Pigeons; Feedlots; Livestock, Nest & Fodder Depredations; and Staging Areas. Of these four, only the label for Feedlots has been registered by New York State Department of Environmental Conservation for use in New York. Wildlife Services anticipates registering the remaining three labels in New York, as well.

Avitrol®, a restricted use pesticide, is a chemical that is classified as an avian distressing agent and is registered for use in New York. It is a chemical frightening agent normally used to avert certain bird species from using certain problem areas. The use of Avitrol® is regulated by the EPA through FIFRA and by New York State Pesticide Control Laws.

Methyl anthranilate (MA) (Rejex-it®, Goose Chase, etc.) is a non-lethal repellent registered for use in New York. MA causes a negative response to birds feeding in the treated area.

Anthraquinone (Flight Control™) is a non-lethal repellent currently registered for use only on geese in New York. This repellent may be considered for use on other bird species in New York if it becomes registered for such use in the future. As part of the planning process, analyses of potential impacts of this repellent are being addressed in this EA to determine potential impacts if and when Anthraquinone becomes registered for use on additional bird species in NY. Similar to MA, this chemical could be used to cause a negative response to birds feeding in treated areas.

Mesurol is a non-lethal repellent not currently registered for use in New York. Mesurol may be considered for future use if it becomes registered in New York. As part of the planning process, analyses of potential impacts of this repellent are being addressed in this EA to determine potential impacts if and when Mesurol becomes registered for use in NY. Mesurol is used to repel crows from the nests of T&E species. The chemical is injected into eggs which are placed in artificial nests or on elevated platforms. Upon ingestion, birds develop post-ingestional malaise (Mason 1989) and develop an aversion to consuming similar-looking eggs.

Alpha-Chloralose (AC) is an avian tranquilizer not currently registered as a pesticide for use in New York. As part of the planning process, analyses of potential impacts of this tranquilizer are being addressed in this EA to determine potential impacts if and when AC is used to manage birds in NY. AC could be used for live-capturing a variety of birds including pigeons and starlings.

Starlicide® is a restricted use avicide not currently registered for use in New York. This avicide may be considered for future use if it becomes registered in New York. As part of the planning process, analyses of potential impacts of this avicide are being addressed in this EA to determine potential impacts if and when Starlicide® becomes registered for use in NY. Starlicide® is a less concentrated version of DRC-1339 and might be recommended or used by WS to control blackbirds, starlings, cowbirds, grackles, sparrows, crows, and pigeons.

The use of registered chemical toxicants and repellents for bird damage management poses little to no risk to human health and safety. WS personnel who apply pesticides are certified restricted use pesticide

applicators and apply pesticides according to label instructions. Certification is obtained after passing written tests administered by the New York State Department of Environmental Conservation. See Appendix B for a detailed description of these chemicals and their potential effects.

Impacts on human safety of non-chemical BDM methods

Some people may be concerned that WS' use of firearms, traps, and pyrotechnic scaring devices could cause injuries to people or present potential fire hazards to agricultural sites and private property. WS personnel occasionally use traps, rifles, and shotguns to remove birds that are causing damage. WS frequently uses pyrotechnics in noise harassment programs to disperse or move birds. There has not been a single pyrotechnic or firearms accident in conjunction with WS management programs in New York's history. Futhermore, there has never been a fire due to pyrotechnic use by NY WS personnel.

Firearm use is a very sensitive public concern because of safety relating to the public and the threat of misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Impacts on human health and safety from birds

The concern stated here is that the absence of adequate BDM would result in adverse effects on human health and safety, because bird damage would not be curtailed or reduced to the minimum levels possible and practical. The potential impacts of not conducting such work could lead to increased incidence of injuries, illness, or loss of human lives.

2.2.4 Impacts to Stakeholders, including Aesthetics

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception and today a large percentage of households have pets. However, some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to reduce conflicts/problems between humans and wildlife.

There may be some concern that the proposed action or alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is a philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature and is dependent on what an observer regards as beautiful.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using up the animal or intending to) or non-consumptive use (e.g., viewing the animal in nature or in a zoo, photography, feeding) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest

and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

Many people, directly affected by problems and threats to public health or safety caused by birds, insist upon their removal from the property or public location when they cause damage. Some members of the public have an idealistic view and believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to public health or safety. Others, directly affected by the problems caused by wildlife, strongly support removal. Individuals not directly affected by the harm or damage caused by wildlife may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Those totally opposed to bird damage management want WS to teach tolerance for damage and threats to public health or safety, and that wildlife should never be killed. Some people would strongly oppose removal of birds regardless of the amount of damage. Some members of the public who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife. These human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment.

The WS program in New York only conducts wildlife damage management at the request of the affected home/property owner or resource manager. If WS received requests from an individual or official for BDM, WS would address the issues/concerns and consideration would be made to explain the reasons why the individual damage management actions would be necessary. Management actions would be carried out in a caring, humane, and professional manner.

2.2.5 Humaneness and Animal Welfare Concerns of Methods Used

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if "*. . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process.*"

Suffering is described as a "*. . . highly unpleasant emotional response usually associated with pain and distress.*" However, suffering "*. . . can occur without pain . . . ,*" and "*. . . pain can occur without suffering . . .* " (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for "*. . . little or no suffering where death comes immediately . . .* " (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would "*. . . probably be causes for pain in other animals . . .* " (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (CDFG 1991).

Pain and suffering, as it relates to WS damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since "*. . . neither medical nor veterinary curricula explicitly address suffering or its relief*" (CDFG 1991).

Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some BDM methods are used in situations where non-lethal damage management methods are not practical or effective.

New York WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/SOPs used to maximize humaneness are listed in Chapter 3.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.3.1 No Wildlife Damage Management at Taxpayer Expense; Wildlife Damage Management should be Fee Based

Funding for WS comes from a variety of sources in addition to federal appropriations. New York State agency funds, county funds, city funds, private funds, and other federal agency funds are applied to the program under Cooperative Agreements. Federal, state, and local officials have decided that wildlife damage management should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Wildlife damage management is an appropriate sphere of activity for government programs, since aspects of wildlife damage management are a government responsibility and authorized and directed by law.

2.3.2 Bird Damage should be Managed by Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce bird damage for property owners or property owners could attempt to reduce their own damage problems. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to contract with a government agency. In particular, large industrial businesses and cities and towns may prefer to use WS because of security and safety issues and reduced administrative burden. Additionally, use of the pesticide DRC-1339 may be the most effective damage management method in some situations, either used alone or as part of an IWDM program. This avicide is registered only for use by WS and is not available to private nuisance wildlife control agents or property owners. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators, if and when it becomes registered for use in NY.

2.3.3 Appropriateness of Preparing an EA (Instead of an EIS) for Such a Large Area

Some individuals might question whether preparing an EA for an area as large as the State of New York would meet the NEPA requirements for site specificity. If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire State may provide a better analysis than multiple EAs covering smaller zones. In addition, the WS program in New York only conducts BDM in a very small area of the State where damage is occurring or likely to occur.

2.3.4 Effectiveness of Bird Damage Management Methods

A concern among members of the public is whether the methods of reducing bird damage will be effective in reducing or alleviating bird damage and conflicts. The effectiveness of each method or methods can be defined in terms of decreased potential for health risks, decreased human safety hazards, reduced property damage, reduced natural resource damage and reduced agricultural damage. In terms of the effectiveness of a specific method or group of methods, this would not only be based on the specific method used, but more importantly upon the skills and abilities of the person implementing the control methods and the ability of that person to determine the appropriate course of action to take. It would be expected that the more experience a person has in addressing bird damage conflicts and implementing control methods the more likely they would be successful reducing damage to acceptable levels. WS technical assistance program provides information to assist persons in implementing their own BDM program, but at times the person receiving WS technical assistance may not have the skill or ability to implement the BDM methods recommended by WS. Therefore, it is more likely that a specific BDM method or group of methods would be effective in reducing damage to acceptable levels when WS professional bird damage assistance is provided than that would occur when the inexperienced person attempts to conduct BDM activities.

CHAPTER 3: ALTERNATIVES

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), Appendix J ("*Methods of Control*"), Appendix N ("*Examples of WS Decision Model*"), and Appendix P ("*Risk Assessment of Wildlife Damage Control Methods Used by USDA, Wildlife Services Program*") of the ADC FEIS (USDA 1997).

3.0 INTRODUCTION

Chapter 3 contains a discussion of the project alternatives, including those that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), alternatives considered but not analyzed in detail, with rationale, and mitigation measures and SOP's for wildlife damage management techniques. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Evaluation of the affected environments will be addressed in more detail in Chapter 4.

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the Council on Environmental Quality's (CEQ's) definition (CEQ 1981).

3.1 ALTERNATIVES ANALYZED IN DETAIL

Alternatives analyzed in detail are:

1) Alternative 1 – Technical Assistance Only
2) Alternative 2 – Integrated Bird Damage Management Program. (Proposed Action/No Action)
3) Alternative 3 – Non-lethal Bird Damage Management Only By WS
4) Alternative 4 – No federal WS Bird Damage Management.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1: Technical Assistance Only

Under this alternative WS would only provide technical assistance and make recommendations when requested. This alternative would not allow for WS operational BDM in New York. Producers, property owners, agency personnel, or others could conduct BDM using any legal lethal or non-lethal method available to them. Currently, DRC-1339 is only available for use by WS employees. Therefore, use of this chemical by others would not occur legally. However, the restricted use pesticide Starlicide® is similar to DRC-1339 and may be used by certified applicators if it becomes registered for use in New York. Avitrol® could also be used by state certified restricted-use pesticide applicators. Additionally, should the avian tranquilizer, Alpha-Chloralose, be registered for use in NY, it would only be available for use by WS employees. Appendix B describes a number of BDM methods available for recommendation by WS under this alternative.

3.2.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Wildlife Services proposes to continue the current bird damage management program that responds to feral pigeon (*Columbia livia*), European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), blackbird {red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*)}, fish crow (*Corvus ossifragus*), and American crow (*Corvus brachyrhynchos*) damage requests in the State of New York. An IWDM approach would be implemented to reduce damage activities to property, agricultural and natural resources, livestock, and public health and safety. Damage management would be conducted on public and private property in New York when the resource owner (property owner) or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS

Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using: shooting, trapping, and registered pesticides. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy. Appendix B provides a more detailed description of the methods that could be used under the proposed action.

The proposed program would be conducted pursuant to applicable laws and regulations authorizing take of feral pigeons, European starlings, English sparrows, blackbirds (red-winged blackbird, brown-headed cowbird, common grackle), American crows, and fish crows, developed through partnerships among WS, USFWS and NYSDEC, and as requested by and through coordination with requestors of assistance. All management actions would comply with applicable federal, state, and local laws.

3.2.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

This alternative would require WS to use non-lethal methods only to resolve bird damage problems. Information on lethal BDM methods would still be available to producers and property owners through other sources such as USDA Agricultural Extension Service offices, NYSDEC, universities, or pest control organizations. Requests for information regarding lethal management approaches would be referred to NYSDEC, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. Persons receiving WS' non-lethal technical and direct control assistance could still resort to lethal methods that were available to them. Currently, DRC-1339 is only available for use by WS employees. If Alpha-Chloralose becomes registered for use in New York, it would be available only to WS employees. Therefore, use of these chemicals by others would be illegal. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators, if it becomes registered for use in New York. Avitrol® could also be used by state certified restricted-use pesticide applicators. Appendix B describes a number of non-lethal methods available for use by WS under this alternative.

3.2.4 Alternative 4: No Federal WS Bird Damage Management

This alternative would eliminate WS federal involvement in BDM in New York. WS would not provide direct operational or technical assistance and requesters of WS' assistance would have to conduct their own BDM without WS input. Information on BDM methods would still be available to producers and property owners through other sources such as USDA Agricultural Extension Service offices, NYSDEC, universities, or pest control organizations. Requests for information would be referred to NYSDEC, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to conduct BDM themselves, use contractual services of private businesses, or take no action. Currently, DRC-1339 is only available for use by WS employees. If it becomes registered for use in New York, Alpha-Chloralose would only be available for use by WS employees, also. Therefore, use of these chemicals by private individuals would be illegal. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators if registered for use in NY. Avitrol® could also be used by state certified restricted-use pesticide applicators.

3.3 BDM STRATEGIES AND METHODOLOGIES AVAILABLE TO WS IN NEW YORK

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2 and 3 described above. Alternative 4 would terminate both WS technical assistance and operational BDM by WS. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

3.3.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in the most cost-effective[2] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion), animal behavior modification (e.g., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

3.3.2 The IWDM Strategies Employed by WS

3.3.2.1 Technical Assistance Recommendations

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for use by non-WS entities. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application.

Under APHIS NEPA implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving bird damage problems.

3.3.2.2 Direct Damage Management Assistance (Direct Control)

Direct damage management assistance includes damage management activities that are directly conducted or supervised by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone and when *Agreements for Control* or other comparable instruments are provided for direct damage management by WS. The initial investigation defines the nature, history, and extent of the problem; species responsible for the damage; and methods available to resolve the problem. The professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary or if the problems are complex.

3.3.2.3 Educational Efforts

Education is an important element of WS program activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures and demonstrations are provided to producers, homeowners, state and county agents, and other interested groups. WS frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are periodically updated on recent developments in damage management technology, laws and regulations, and agency policies.

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[2] The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

3.3.2.4 Research and Development

The National Wildlife Research Center (NWRC) functions as the research arm of WS by providing scientific information and development of methods for wildlife damage management that are effective and environmentally responsible. NWRC scientists work closely with wildlife managers, researchers, field specialists and others to develop and evaluate wildlife damage management techniques. NWRC research was instrumental in the development of Methyl Anthranilate. In addition, NWRC is currently testing new experimental drugs that inhibit bird reproduction. NWRC scientists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

3.3.2.5 Examples of WS Direct Operational and Technical Assistance in BDM in New York

Management of Wildlife Hazards to Aircraft and Air Passengers in New York

WS participates with FAA under a MOU to provide wildlife damage management information or services, upon request, to airport managers in New York. WS may evaluate wildlife hazards at an airport through the preparation of a Wildlife Hazard Assessment. This assessment outlines wildlife hazards found at the airport and are used to assist airports in developing Wildlife Hazard Management Plans. The plans may include specific recommendations to reduce threats and hazards associated with a particular wildlife species, including flocking birds (i.e., starlings and blackbirds); as well as pigeons, sparrows, and crows. IWDM strategies are typically employed and recommended for these facilities.

WS' current program in New York utilizes 1 full-time employee and 4 part-time employees to conduct IWDM programs and to monitor wildlife hazards at airports to insure the protection of human lives and aircraft. In addition to direct operational activities consisting of various harassment and lethal removal techniques aimed at potentially injurious wildlife, WS personnel provide ongoing technical advice to airport managers about how to reduce the presence of wildlife in airport environs. Since 1998, three Wildlife Hazard Assessments have been completed for airports in New York State and five are currently underway. WS also participates in various habitat management projects implemented by airport personnel by providing technical expertise about specific wildlife damage management strategies and methods. In addition, WS promotes improved bird strike record keeping and maintains a program of bird identification and monitoring of bird numbers at participating airports.

WS may receive requests for assistance in resolving wildlife hazards to aviation in the future from airport management previously discussed, or any other airports in New York. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in airport environments.

Management of Damage Caused by Pigeons

Pigeon droppings deface and accelerate the deterioration of buildings and increase the cost of maintenance. Large amounts of droppings are aesthetically displeasing, produce an objectionable odor and may kill vegetation. Pigeons may also carry and spread diseases and parasites to people and livestock through their droppings and presence. Pigeons located around airports can also be a threat to human safety because of potential bird-aircraft collisions.

- The New York WS program provided assistance to Pepsi Arena in Albany, New York in 2003 in response to bird damage complaints. Pigeons roosting, loafing and nesting in walkways were posing a structural damage threat to the property and a disease threat to the public using these walkways. WS provided recommendations to install porcupine wires to reduce loafing and roosting sites, erect no feeding signs throughout the area and place netting over openings on the walkways to reduce pigeon access.
- CSX Transportation, one of the nation's largest railroad companies, entered into a Cooperative Service Agreement with NY WS in 2001 to protect human health and safety as

well as property. Bird droppings deposited from excessive numbers of pigeons roosting, loafing, and nesting in structures on CSX property generated complaints.

- The NY WS program contracted with New York State's Department of Transportation in response to complaints of pigeon damage in salt domes. Birds that were roosting, loafing and nesting in these structures posed a threat to property as well as to human health and safety through transmission of disease to DOT workers.
- Similar work was conducted at a National Air Guard Base in NY, in order to reduce the threats associated with roosting, loafing and nesting pigeons in plane hangars.

WS may receive requests for assistance in resolving wildlife conflicts with pigeons in the future from properties previously discussed, or any other property owners in New York. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in urban, rural or agricultural environments.

Management of Damage Caused by Starlings and Blackbirds

Starlings and blackbirds (including red-winged blackbirds, common grackles, and brown-headed cowbirds) are frequently considered pests because of the problems they cause, especially at livestock facilities and near urban roosts. Starlings may selectively eat the high-protein supplements that are often added to livestock rations. These birds may also be responsible for transferring disease from one livestock facility to another. They cause damage by consuming cultivated fruits and have been found to damage ripening corn, sprouting grains and planted seeds. Large winter starling roosts that occur in buildings, industrial structures, or in trees near homes are a problem in both rural and urban sites because of health concerns, filth, noise, and odor.

- NY WS provides technical assistance and direct control to a number of dairy farms and feedlots in the State. Methods for damage prevention and control include habitat modification; exclusion from barns, buildings, and feedlots; and applying DRC-1339 avicide to starling and blackbird bait (Appendix B).
- WS currently provides information or services, upon request, to landfills in New York. WS assists with reducing the number of European starlings and blackbirds feeding and loafing at the landfills, using and recommending IWDM strategies for these facilities. Federal (Federal Register 1991) and State regulations (6NYCRR Part 360-1.14) mandate that solid waste management facilities in New York State prevent or control potential vectors. Currently, NY WS utilizes 4 full-time employees and 2 part-time employees for controlling birds at landfills. Since 1998, control programs have been completed annually for three landfills. Direct control activities used at landfills include harassment with pyrotechnics, propane exploders, flags, and distress tapes. Shooting of a limited number of birds is also used to increase the effectiveness of non-lethal harassment. As part of the IWDM strategy, WS also provides landfill operators with recommendations concerning habitat modifications and alteration of cultural practices.

WS may receive requests for assistance in resolving wildlife conflicts with starlings and blackbirds in the future from properties previously discussed, or any other property owners in New York. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in urban, rural or agricultural environments.

Management of Damage Caused by Crows

The amount and degree of damage is highly variable for crows; damage can depend on season, local weather, time of harvest, amount of crop production, and availability and distribution of other food sources. They do, however, damage seedling and ripening crops. Large fall and winter crow roosts can cause serious problems in urban areas. Roosts are objectionable because of the odor and accumulation of bird droppings, health concerns, noise, and damage to roost trees. Large crow flocks may also be a factor in spreading disease. Feeding in and around farm buildings threaten livestock and human health and safety; feeding near wetlands has the potential for the

spread of waterfowl diseases. Crow roosts that have been in place for several years may harbor a fungus that causes histoplasmosis.

- 6NYCRR Part 360-1.14 (1) requires solid waste management facilities in New York State to "...prevent or control on-site populations of vectors..." WS provides assistance with crow conflicts associated with NY landfills; these conflicts include accumulation of feces on equipment and buildings, distraction of machine operators, and the potential for birds to transmit disease to workers on site. Crow conflicts associated with property surrounding the landfill include birds loafing on site and the subsequent accumulation of feces on houses, cars, birds depositing garbage on houses and lawns and the potential for birds for transmit disease to residents. Control methods include shooting, trap and euthanasia, as well as non-chemical, non-lethal methods.
- NY WS has provided assistance to the Cities of Troy, Albany, and Utica, NY in the dispersal of communal crow roosts. These cities have seen a significant increase in the number of crows using trees as night roosts near downtown businesses and residential locations. Increased concerns expressed by residents of these areas led to City governments requesting assistance from WS. As a result, WS implemented non-lethal hazing projects to investigate techniques to change night roosting patterns of crows in the Utica, Troy, and Albany areas. Pyrotechnics, lasers, and amplified, recorded crow distress calls were the methods used to disperse crows.
- In the spring of 2001, NY WS entered into a cooperative agreement with NYS Department of Health Zoonoses Program to design and implement a 1-800 toll-free phone system to collect dead bird reports from throughout NYS. This phone system was executed in response to growing health and safety concerns over West Nile Virus (WNV). The Cooperative WNV Dead Bird Hotline is designed to maximize the utility of dead bird surveillance for WNV by providing to the public an easy-to-use mechanism for reporting dead birds and making them available for testing. In 2001, the hotline was operational from June 15 to October 31 and received a total of 1,167 requests for assistance. In 2002, the hotline was initiated on June 3 and call volume has increased significantly compared to the previous year. In 2002, Wildlife Specialists handled approximately 7,000 requests for assistance including 4,784 dead bird reports entered into the network and another 1,922 calls that were general in nature or required a referral to the county health departments and were not entered into the network.

WS may receive requests for assistance in resolving wildlife conflicts with crows in the future from properties previously discussed, or any other property owners in New York. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in urban, rural or agricultural environments.

Technical Assistance in Bird Damage Management

Currently, the majority of bird damage management activities concerning pigeons, European starlings, English sparrows, blackbirds, and crows are in the form of technical assistance.

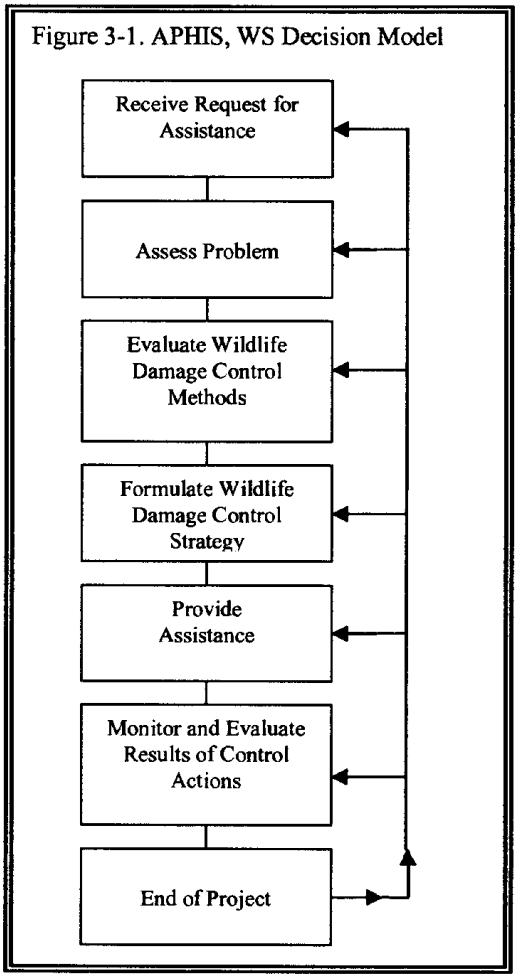
- WS provides information in response to requests to protect property, human health and safety, natural resources, and agriculture. As part of the IWDM strategy, WS provides recommendations concerning habitat modifications, harassment, and alteration of culture practices. WS may assist property owners, natural resource managers, agricultural workers and/or anyone involved in protecting resources in obtaining information for managing bird damage.

3.3.3 WS Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints which is depicted by the WS Decision Model and described by Slate et al. in 1992 (Figure 3-1). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for effectively reducing damage. WS personnel assess the problem then evaluate

the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions.

Figure 3-1. WS Decision Model



3.3.4 Bird Damage Management Methods Available for Use or Recommendation by WS

3.3.4.1 Non-chemical, Non-lethal Methods (See Appendix B for detailed descriptions)

Agricultural producer and property owner practices consist primarily of non-lethal preventive methods such as cultural methods[3] and habitat modification.

Animal behavior modification refers to tactics that alter the behavior of birds to reduce damages. Some but not all of these tactics include the following:

- Exclusions, such as netting
- Propane exploders (to scare birds)

[3] Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife damage.

- Pyrotechnics (to scare birds)
- Distress calls and sound producing devices (to scare birds)
- Visual repellents and other scaring tactics
- Lasers

Relocation or **dispersal** of damaging birds to other areas.

Nest destruction of the target species before eggs or young are in the nest.

Egg addling/oiling/destruction is the practice of destroying the embryo in the egg prior to hatching; physically breaking eggs; or directly removing eggs from a nest and destroying them.

Habitat/environmental modification to attract or repel certain bird species.

Live traps are various types of traps designed to capture birds alive. Some examples are clover traps, decoy traps, nest box traps, mist nets, cannon nets, leg-hold traps, corrals, etc. Captured target birds can then be euthanized.

Decoy and nest box traps are sometimes used by WS to capture blackbirds, crows and European starlings. Decoy traps are set in limited numbers in selected locations where a resident population is causing localized damage or where other techniques cannot be used. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds are placed in the trap with sufficient food and water to assure their survival. Feeding behavior and calls of the decoys attract other birds into the trap. Birds taken in these traps are euthanized.

Lure crops/alternate foods are crops planted or other food resources provided to mitigate the potential loss of higher value crops.

3.3.4.2 Chemical, Non-lethal Methods (See Appendix B for detailed descriptions)

Avitrol® is a chemical frightening agent is registered for use against pigeons, crows, gulls, blackbirds, European starlings, and English sparrows in various situations. This chemical repels birds by poisoning a few individual members of a flock of birds, causing distress behavior in the birds that consume treated baits from a mixture of treated and untreated bait. These distress calls then generally frighten the other birds from the site. Only a small number of birds need to be affected to cause alarm in the rest of the flock. In most cases, those birds that consume the treated bait will die (Johnson and Glahn 1994).

Alpha-Chloralose (AC) is an avian tranquilizer not currently registered for use in New York but may be considered for use if it becomes registered in the future. As part of the planning process, analyses of potential impacts of this tranquilizer are being addressed in this EA to determine potential impacts if and when AC becomes registered for use in NY. AC is an immobilizing agent, which is a central nervous system depressant, and used to capture pigeons or other birds. It is generally used in recreational and residential areas, such as near swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-Chloralose is typically delivered as a well-contained bait in small quantities with minimal hazards to pets and humans; single baits consisting of bread or corn are fed directly to the target birds.

Mesurol is used to repel crows from the nests of T&E species and is not currently registered for use in New York, but may be considered for use if it becomes registered in the future. As part of the planning process, analyses of potential impacts of this repellant are being addressed in this EA to determine potential impacts if and when Mesurol becomes registered for use in NY. The active ingredient is injected into eggs which are placed in artificial nests or on elevated platforms. Upon ingestion, birds develop post-ingestional malaise (Mason 1989) and develop an aversion to consuming similar-looking eggs.

Tactile repellents reportedly deter birds from roosting, perching, or nesting on certain structural surfaces by creating a tacky or sticky surface that the birds avoid.

Methyl Anthranilate (MA) and **Di-methyl Anthranilate** (artificial grape flavoring food additive) is a non-lethal repellent, registered for use in New York, that has been shown to be an effective repellent for many bird species. It can be applied to turf or surface water or as a fog to repel birds from small areas. It may also become available for use as a livestock feed additive that has bird repellent value.

Other repellents: Other bird repellents that might become available for use in NY include anthraquinone (Flight Control™) (Avery et al. 1997) and particulate feed additives, such as charcoal particles (e.g., adhered to livestock feed). Flight Control™ is a non-lethal bio-pesticide that could be used to reduce feeding activity in treated areas.

3.3.4.3 Mechanical, Lethal Methods (See Appendix B for detailed descriptions)

Snap traps are considered quick-kill traps. They are modified rat traps that are used to remove individual birds causing damage to buildings.

Shooting is more effective as a dispersal technique than as a way to reduce bird numbers. The number that can be killed by shooting is generally very small in relation to the number involved in damage situations. Usually only a few dozen birds can be shot from individual flocks that can number anywhere from a few hundred to many thousands or hundreds of thousands of birds before the rest of the birds become gun shy. Shooting, however, can be helpful in some situations to supplement and reinforce other dispersal techniques. It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with rifles, shotguns, or pellet guns (rifles or pistols) is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible.

Hunting can be part of a BDM strategy to enhance the effectiveness of harassment techniques for crows.

Cervical dislocation is approved by the American Veterinary Medical Association (AVMA) and may be used to euthanize birds which are captured in live traps.

3.3.4.4 Chemical, Lethal Methods (See Appendix B for detailed descriptions)

DRC-1339 is a slow-acting avicide used for reducing damage from several species of birds, including blackbirds, European starlings, cowbirds, grackles, pigeons, English sparrows, and crows. DRC-1339 is highly toxic to sensitive species, but only slightly toxic to non-sensitive birds, predatory birds and mammals. This chemical would be the primary lethal chemical method used for bird damage management under the proposed program.

Starlicide® (3-chloro-p-toluidine hydrochloride), a toxicant not currently registered for use in New York, may be considered for use if it becomes registered in NY in the future. As part of the planning process, analyses of potential impacts of this toxicant are being addressed in this EA to determine potential impacts if and when Starlicide® becomes registered for use in NY. This chemical is a restricted use pesticide that is formulated as a 0.1% ready-to-use product and is commercially available to certified applicators or persons under their supervision. This avicide may be recommended or used by WS to control European starlings, blackbirds, cowbirds, grackles, English sparrows, crows, and pigeons. Starlicide® may be used in feedlots, around buildings and fenced non-crop areas, bird staging and roosting areas, federal and state wildlife refuges, and other sites (EPA 1995). Starlicide® is similar to DRC-1339 used in feedlots; however, it contains 0.1% DRC-1339 (USDA 1997, Appendix P). Therefore, the properties of this product are similar to DRC-1339.

Carbon dioxide (CO_2) gas is an AVMA-approved euthanasia method which is sometimes used to euthanize birds that have been chemically immobilized or captured in live traps. Live birds are placed in a container or chamber into which CO_2 gas is released. The birds quickly expire after inhaling the gas.

3.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered, but not analyzed in detail. These were:

3.4.1 Lethal Bird Damage Management Only By WS

Under this alternative, WS would not conduct any non-lethal control of birds for BDM purposes in the State, but would only conduct lethal BDM. This alternative was eliminated from further analysis because some bird damage problems can be resolved effectively through non-lethal means. Additionally, lethal methods may not always be available for use due to safety concerns or local ordinances prohibiting the use of some lethal methods, such as the discharge of firearms. For example, a number of damage problems involving the encroachment of injurious birds into buildings can be resolved by installing barriers or repairing of structural damage to the buildings, thus excluding the birds. Furthermore, damage situations such as large flocks of injurious birds on/near runways could not be removed immediately by lethal means, while scaring them away through various harassment devices might resolve the threat to passenger safety at once.

3.4.2 Compensation for Bird Damage Losses

The compensation alternative would require the establishment of a system to reimburse persons impacted by bird damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the ADC Final EIS indicated that the concept has many drawbacks (USDA 1997):

- It would require larger expenditures of money and labor to investigate and validate all damage claims to determine and administer appropriate compensation.
- Compensation would most likely be less than full market value. Responding in a timely fashion to all requests to assess and confirm damage would be difficult and certain types of damage could not be conclusively verified. For example, proving conclusively in individual situations that birds were responsible for disease outbreaks would be impossible, even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.
- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.
- Not all resource owners would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by state law.
- Compensation would not be practical for reducing threats to human health and safety.

3.4.3 Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all WS program efforts toward total long term elimination of bird populations on private, state, local and federal government lands wherever a cooperative program was initiated in the State. In New York, eradication of native bird species (European starling, English sparrow, and feral domestic pigeon are not native to North America) is not a desired population management goal of state agencies. Although generally difficult to achieve,

eradication of a local population of feral domestic pigeons, English sparrows or European starlings may be the goal of individual BDM projects in fulfillment of Executive Order 13112 regarding Invasive Species (see Subsection 1.7.2). However, eradication as a general strategy for managing bird damage will not be considered in detail because:

- All state and federal agencies with interest in, or jurisdiction over, wildlife oppose eradication of any native wildlife species.
- Eradication is not acceptable to most people.
- Blackbirds and European starlings are migratory and eradication would have to be targeted at the entire North American populations of these species to be successful. Such a program would not be feasible or desirable.

Population suppression would direct WS program efforts toward managed reduction of certain problem populations or groups. Population suppression may be desired for feral domestic pigeons, English sparrows and European starlings since they are not native to North America and are only present because of human introduction. In areas where damage can be attributed to localized populations of birds, WS can decide to implement local population suppression as a result of using the WS Decision Model. However, it is not realistic or practical to consider large-scale population suppression as the basis of the WS program. Typically, WS activities in the State would be conducted on a very small portion of the sites or areas inhabited or frequented by problem species. Problems with the concept of suppression are similar to those described above for eradication.

3.4.4 Use of Bird-proof Feeders in Lieu of Lethal Control at Dairies and Cattle Feeding Facilities

Bird-proof feeders were proposed by Animal Protection of New Mexico (APNM), Inc. as a method for excluding birds at dairies and cattle feeding facilities in that State. This method would involve the installation of 1/8" thick steel panel feed troughs, covered by parallel 4-6 inch spaced steel cables or wires running from the outer top edge of the trough up at a 30-45 degree angle to the top of the head chutes that cattle use to access the feed. Vertical canvas strips would be hung from the cables. The feeder was reportedly designed for use with horses. A copy of a diagram of this system was sent to Mr. Jim Glahn, Bird Control Research Biologist at the WS-National Wildlife Research Center (NWRC), who has nearly 12 years of experience researching problems caused by European starlings at livestock feeding operations. He found the following:

- A major flaw in the design is the spacing of the cables at 4-6" which would allow European starlings to drop through. Reducing the spacing to 2" as recommended by Johnson and Glahn (1994) would likely interfere with the delivery of feed to the troughs. Interference would occur because the feed mixture currently used by most dairies is a mixture of chopped alfalfa hay and corn silage with a grain component. The alfalfa/corn silage portion would likely hang up on the cable or wire strands of the troughs and much would fall outside the troughs, with increased feed waste a result (Twedt and Glahn 1982).
- the spacing of the canvas strips is not specified, and canvas would deteriorate quickly from cattle licking and weather (Twedt and Glahn 1982).

Mr. Glahn expressed the opinion, based on Twedt and Glahn (1982) and Feare (1984), that exclusion methods to reduce starling depredations at livestock feeding operations are usually the least cost-effective solution. Despite the above concerns about the bird-proof feeder system recommended by APNM, Inc., similar types of systems could be recommended by WS under the current program should any become available that are effective, practical, and economically feasible for producers to implement.

3.5 MITIGATION MEASURES AND STANDARD OPERATING PROCEDURES

3.5.1 Mitigation in Standard Operating Procedures (SOPs)

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for effects that otherwise might result from that action. The current WS program, nationwide and in New York, uses such mitigation measures and these are discussed in detail in Chapter 5 of the ADC Final EIS (USDA 1997). Some key mitigating measures pertinent to the proposed action and alternatives of this EA that are also incorporated into WS' SOPs include:

- The WS Decision Model thought process is used to identify effective wildlife damage management strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- All WS employees in the State using restricted use chemicals are trained and certified by, or operate under the direct supervision of, program personnel or others who are experts in the safe and effective use of chemical BDM materials.
- The presence of non-target species is monitored before using DRC-1339 (or Starlicide®) to reduce the risk of mortality of non-target species populations.
- Research is being conducted to improve BDM methods and strategies so as to increase selectivity for target species, to develop effective non-lethal control methods, and to evaluate non-target hazards and environmental effects.
- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species. Generalized population suppression across the State, or even across major portions of the State, would not be conducted.
- WS uses BDM methods and conducts activities for which the risk of hazards to human safety and the environment have been determined to be low according to a formal risk assessment (USDA 1997, Appendix P). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.

3.5.2 Additional Mitigation Specific to the Issues

The following is a summary of additional mitigation measures that are specific to the issues listed in Chapter 2 of this document.

3.5.2.1 Effects on Target Species Populations

- BDM activities are directed toward resolving bird damage problems by taking action against individual problem birds, or local populations or groups, not by attempting to eradicate populations in the entire area or region.
- WS take is monitored by comparing numbers of birds killed by species or species group (e.g., blackbirds) with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse effects to the viability of native species populations (See Chapter 4).

3.5.2.2 Effects on Non-target Species Populations, including T&E Species

- WS personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding non-target take.

- Observations of birds feeding at feedlots, dairies, or blackbird/European starling staging areas or observations of birds that are associated with feral domestic pigeon concentrations are made to determine if non-target or T&E species would be at risk from BDM activities.

- WS has consulted with the USFWS regarding potential effects of BDM control methods on T&E species and abides by reasonable and prudent alternatives (RPAs) and/or reasonable and prudent measures (RPMs) established as a result of that consultation. For the full context of the Biological Opinion, see the ADC Final EIS, Appendix F (USDA 1997). Further consultation on species not covered by or included in that formal consultation process will be initiated with the USFWS and WS will abide by any RPAs, RPMs, and terms and conditions that result from that process to avoid jeopardizing any listed species.

- WS uses chemical methods for BDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. This section analyzes the environmental consequences of each alternative in comparison with the no action alternative to determine if the real or potential effects would be greater, lesser, or the same.

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

Cumulative Effects: Discussed in relationship to each of the alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analyses of potential cumulative impacts to target and non-target species, including T&E species.

Irreversible and Irretrievable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Effects on sites or resources protected under the National Historic Preservation Act: WS BDM actions are not undertakings that could adversely affect historic resources (See Section 1.7.2).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Effects on Target Bird Species

4.1.1.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would have no impact on target bird populations in the State because the program would not provide any operational BDM activities. The program would be limited to providing advice only. Private efforts to reduce or prevent bird damage and perceived disease transmission risks could increase, which could result in similar or even greater effects on those populations than the Proposed Action. However, for the same reasons shown below in the population effects analysis in section 4.1.1.2, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. DRC-1339 and the tranquilizer Alpha-Chloralose, if it becomes registered for use in NY, would only be available for use by WS employees and not be available for use under this alternative.

4.1.1.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Analysis of this issue is limited to those species killed during WS BDM. The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). Magnitude is described in USDA (1997) as "*. . . a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage.

<u>Breeding Bird Surveys</u>. Bird populations can be monitored by using data from the Breeding Bird Surveys (BBS). The BBS is a large-scale inventory of North American birds coordinated by the

U.S. Geological Survey, Patuxent Wildlife Research Center (Sauer et al 2003). The BBS is a combined set of over 3,700 roadside survey routes primarily covering the continental United States and southern Canada. The BBS was started in 1966, and routes are surveyed in June by experienced birders. The stated primary objective of the BBS has been to generate an estimate of population change for all breeding birds. Populations of birds tend to fluctuate, especially locally, as a result of variable annual local habitat and climatic conditions. Trends can be determined using different population equations, and statistically tested to determine if a trend is significant. The significance of a trend's "change" is reflected in the calculated P-value (probability) for that species.

The BBS data is best used to monitor population trends. However, the average number of birds counted per route (relative abundance) can be used to theoretically estimate the population size (relative abundance/10 mi^2 x 53,989 mi^2 (total land/water area in New York)). To use these population estimates the following assumptions would need to be accepted.

1. All birds within a quarter mile of the observer are seen at all stops on a BBS route; this assumption is faulty because observers often cannot see a quarter mile in radius at all stops due to obstructions such as hills, trees, and brush and because some bird species can be very elusive. Therefore, the number of birds seen per route would provide a conservative estimate of the population.
2. The chosen survey routes are totally random and are fully representative of available habitats. When BBS routes are established, survey rules allow the observers to make stops for surveys based on better quality habitat or convenient and safe parking areas, even though the survey sites are supposed to be spaced a half-mile apart. Therefore, if survey areas had stops with excellent food availability, the count survey could be biased. This would tend to overestimate the population. However, if these sites were not on a route at all, the population could be underestimated.
3. Birds are equally distributed throughout the survey area and routes were randomly selected. Routes are randomly picked throughout the State, but are placed on the nearest available road. Therefore, the starting point is picked for accessibility by vehicle. However a variety of habitat types are typically covered since most BBS routes are selected because they are "off the beaten path" to allow observers to hear birds without interruption from vehicular noise.

Christmas Bird Counts. The National Audubon Society (NAS) conducts nationwide bird surveys in December to early January (the NAS Christmas Counts). The Christmas Bird Counts (CBC) reflect the number of birds frequenting the state during the winter months. The CBC data does not provide a population estimate, but can be used as an indicator of trends in the population. Researchers have found that population trends reflected in CBC data tend to correlate well with those from censuses taken by more stringent means (National Audubon Society 2002).

Table 4-1. Number of pigeons, starlings, house sparrows, blackbirds, and crows targeted for harassment or killing during the last five fiscal years.

Fiscal Year	Non-lethally Harassed	Killed
1999	1,665,608	1,749
2000	1,478,006	5,377
2001	1,301,875	5,170
2002	846,115	3,354
2003	683,351	6,959
Total	841,179	11,407

European Starling Population Effects

Colonization of North America by the European Starling began on March 6, 1890 when a Mr. Eugene Scheifflin, a member of the Acclimatization Society, released 80 starlings into New York's Central Park. The birds thrived and exploited their new habitat. By 1918, the advance line of migrant juveniles extended from Ohio to Alabama; by 1926 from Illinois to Texas; by 1941 from Idaho to New Mexico; and by 1946 to California and Canadian coasts (Miller 1975). In just 50 short years the starling had colonized the United States and expanded into Canada and Mexico and 80 years after the initial introduction had become one of the most common birds in North America (Feare 1984). Starlings nest in holes or cavities almost anywhere. Females lay 4 to 7 eggs per clutch. Sometimes 2 clutches of eggs are laid per season, but most of the production is from the first brood fledged (Johnson and Glahn 1994). Throughout the year, starlings associate in flocks and form communal roosts at night-even during breeding season. These roosts are larger during fall and winter, when roosts of more than a million birds are not uncommon (Cornell Lab of Ornithology 1999, Johnson and Glahn 1994). Starlings like to return to the same area to forage each day, usually early and late in the day, while traveling at other times in large flocks to more abundant food sources. Migratory behavior appeared in North American starlings shortly after their introduction; they are at least partly migratory throughout the Mid-Atlantic States and are mostly migratory in the Midwest and Great Lakes area. Starlings are migrants and move out of northern areas, between September and early December. Spring migration takes place from mid-February to the end of March (Cornell Lab of Ornithology 1999).

Breeding Bird Survey trend data from 1966-2003 indicate that European starling populations have decreased at an annual rate of -1.8%, -0.6%, and -0.9% throughout New York, the United States, and the eastern region, respectively (Sauer et al. 2004). With a relative abundance of 92.07 birds/10 mi^2, a total New York summer starling population could be estimated at approximately 498,000 birds. Fall and winter starling populations in New York include both the breeding and migratory populations that pass through the state. New York Christmas Bird Count data from 1966-2002 show a decreasing population trend for wintering populations of starlings throughout the state (National Audubon Society 2002).

Precise counts of starling populations do not exist but one estimate placed the nationwide starling population at an estimated 140 million birds (Johnson and Glahn 1994). More recent estimates place the nationwide population at 200 million (Walsh et al. 1999). Natural mortality in starling populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). Therefore the estimated natural mortality of starlings in the U.S should be between 70 and 91 million birds annually. Based upon an anticipated increase in requests for services, WS's lethal management of starlings in New York would be expected to be no more than approximately 3% of the total U.S. natural mortality (2 million birds) in any one year under the Proposed Action. WS BDM activities would affect both breeding and migratory starling populations.

Starlings are an introduced rather than a native species and are not protected by federal law, nor are they protected by New York state law. Starlings are non-indigenous and often have negative impacts on and compete with native birds. Starlings are considered by many wildlife biologists and ornithologists to be an undesirable component of North American ecosystems. Any reduction in starling populations in North America, even to the extent of complete eradication, could be considered a beneficial impact to native bird species.

Based on the above information, WS BDM activities should have minimal effects on local, statewide, regional or continental starling populations. NYSDEC bureau of Wildlife staff concurs with this assessment (B. Swift, pers. comm.).

Red-winged Blackbird, Common Grackle and Brown-headed Cowbird Population Effects

Red-winged blackbirds, common grackles and brown-headed cowbirds are considered to be part of the blackbird species group described in USDA (1997) and are estimated to represent 38%, 22% and 18% of this group, respectively (Meanley and Royall 1976).

The red-winged blackbird is by far the most common member of the blackbird group, and its range extends from Canada to the West Indies and Costa Rica (Peterson 1980). Red-winged blackbirds are abundant in marshes, fields, and woods, where they consume insects, small fruits, wild seeds, grain, and small aquatic life (Peterson 1980). Clutch size ranges from three to five eggs (Bull and Farrand 1977). Red-wing blackbirds nest throughout much of North America and migrate to and winter in the southern U.S. (Dolbeer 1994). BBS trend data from 1966-2003 indicate that red-winged blackbird populations have been declining throughout the United States, the Eastern BBS region, and New York at an annual rate of -0.9%, -1.6%, and -2.6%, respectively (Sauer et al. 2004). With a relative abundance of 95.79 birds/10 mi^2, a total New York summer red-winged blackbird population could be estimated at approximately 520,000 birds. Fall and winter red-winged blackbird populations in New York include both the breeding and migratory populations that pass through the state. New York Christmas Bird Count data from 1966-2002 show a decreasing population trend for wintering populations of red-winged blackbirds throughout the state (National Audubon Society 2002).

The brown-headed cowbird is the smallest member of the blackbird group. It is common throughout the United States and often is found near livestock, and in flocks of mixed blackbird species. This bird inhabits agricultural land, fields, woodland edges, and suburban areas (Bull and Farrand 1977). The preferred food of brown-headed cowbird includes: insects, small fruits, wild seeds, grain, and small aquatic life (Peterson 1980). It is a social parasite that often lays its eggs in the nests of rarer bird species. Cowbirds occur throughout much of North America in the spring and summer and migrate to over winter in the central and southern U.S. (Dolbeer 1994). BBS trend data from 1966-2003 indicate that brown headed cowbird populations have decreased throughout the United States, the Eastern BBS region, and New York at an annual rate of -0.9%, -1.9%, and -2.5%, respectively (Sauer et al. 2004). With a relative abundance of 8.92 birds/10 mi^2, a total New York summer brown-headed cowbird population could be estimated at approximately 48,300 birds. Fall and winter brown-headed cowbird populations in New York include both the breeding and migratory populations that pass through the state. New York Christmas Bird Count data from 1966-2002 show a decreasing population trend for wintering populations of brown headed cowbirds throughout the state (National Audubon Society 2002).

The common grackle occupies a range that includes Canada and the United States east of the Rockies (Peterson 1980). This bird inhabits croplands, fields, parks, lawns, and open woodland (Bull and Farrand 1977). The grackle has an extremely varied diet, which includes insects, crayfish, frogs, other small aquatic life, mice, nestling birds, eggs, sprouting and ripened grains, seeds, and fruits (Bull and Farrand 1997; Peterson 1980). These birds form large flocks during migration and in winter roosts and often form breeding colonies. Common grackles usually nest in tall evergreens and have clutch size of five eggs. Common grackles nest throughout much of North America east of the Rocky Mountains and migrate to and winter in the southern U.S. (Dolbeer 1994). BBS trend data from 1966-2003 indicate that common grackle populations have been declining throughout the United States, the Eastern BBS region, and New York at an annual rate of -1.3%, -1.3%, and -2.4%, respectively (Sauer et al. 2004). With a relative abundance of 42.47 birds/10 mi^2, a total New York summer common grackle population could be estimated at approximately 231,000 birds. Fall and winter grackle populations in New York include both the breeding and migratory populations that pass through the state. New York Christmas Bird Count data from 1966-2002 show an increasing population trend for wintering populations of common grackles throughout the state (National Audubon Society 2002).

Precise counts of blackbird populations do not exist, but one estimate placed the United States summer population of the blackbird group at over 1 billion (USDA 1997) and the winter

population at 500 million (Royall 1977). Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). The annual population of blackbirds in the eastern U.S. is at least 232 million (Meanley and Royall 1976, Johnson and Glahn 1994). Therefore the estimated natural mortality of the blackbird group in the eastern U.S should be between 116 and 140 million birds annually. Based upon an anticipated increase in requests for services, WS's lethal management of red-winged blackbirds, brown-headed cowbirds and common grackles in New York would be expected to be less than 0.05% of the total natural mortality (58,000 birds) in the eastern U.S. in any one year under the Proposed Action. WS BDM activities would affect both breeding and migratory blackbird populations.

Dolbeer et al. (1995) showed that WS kills of 3.6% of the wintering population had no effect on breeding populations the following spring. Dolbeer et al. (1976) constructed a population model which indicated that a reduction of 14.8% of the wintering blackbird population would reduce the spring breeding population by 20% and that a 56.2% reduction in the wintering blackbird population would reduce spring breeding populations by only 33%. Given the density-dependent relationships in a blackbird population (i.e. decreased mortality and increased fecundity of surviving birds) a much higher number would likely have to be killed in order to impact the regional breeding population.

The USFWS has established a Depredation Order (50 CFR 21.43) for blackbirds, whereby no Federal permit is required to remove blackbirds if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance. The USFWS, as the agency with management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on blackbird populations would have no significant adverse impact on the quality of the human environment.

Based on the above information and USFWS oversight, WS BDM activities should have minimal effects on local, statewide, regional or continental blackbird populations. NYSDEC Bureau of Wildlife staff concur with this assessment (B. Swift, pers. comm.).

Feral Domestic Pigeon Population Effects

Domestic pigeons, or rock doves, are a non-indigenous species that were first introduced into the United States by European settlers as a domestic bird to be used for sport, carrying messages, and as a source of food (USFWS 1981). Many of these birds escaped and eventually formed the feral pigeon populations that are now found throughout the United States, southern Canada, and Mexico (Williams and Corrigan 1994). Pigeons are highly dependent on humans to provide them with food and sites for roosting, loafing, and nesting (Williams and Corrigan 1994). Thus, they are commonly found around city buildings, bridges, parks, farm yards, grain elevators, feed mills, and other manmade structures (Williams and Corrigan 1994). Additionally, although pigeons are primarily grain and seed eaters, they will readily feed on garbage, livestock manure, spilled grains, insects, and any other available bits of food (Williams and Corrigan 1994). Pigeons are monogamous and lay 1 to 2 eggs after mating (Williams and Corrigan 1994). At 4 to 6 weeks of age the young leave the nest with more eggs often being laid prior to the young vacating the nest. Breeding may take place year round, with peak reproduction occurring during the spring and summer months. Natural mortality in pigeon populations is about 30% annually (Williams and Corrigan 1994).

Breeding Bird Survey trend data from 1966-2003 indicate that pigeon populations have been relatively stable throughout the United States, the Eastern BBS region, and New York, changing at annual rates of -0.2%, 0. 0%, and -0.1%, respectively (Sauer et al. 2004). With a relative abundance of 13.53 birds/10 mi^2, a total New York summer pigeon population could be estimated at approximately 73,700 birds, which is most likely a low estimate due to a bias away from urban routes. New York Christmas Bird Count data from 1966-2002 show an increasing population

trend for wintering populations of pigeons throughout the state (National Audubon Society 2002). Based upon an anticipated increase in requests for services, WS's lethal management of pigeons in New York would be expected to be no more than approximately 9,000 feral pigeons in any one year under the Proposed Action.

Feral domestic pigeons are an introduced rather than a native species and are not protected by federal law, nor are they protected by New York state law. However, within the limits of New York City the city's Department of Health does regulate the take of feral pigeons. Any BDM involving lethal control actions by WS for this species would be restricted to isolated, individual sites, or communities. In those cases where feral domestic pigeons are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment since the affected property owner or administrator would request it. Although regional population impacts would be minor, even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems. However, some individuals who experience aesthetic enjoyment of pigeons may consider a major population reduction in some localities a negative impact.

Based on the above information, WS BDM activities should have minimal effects on local, statewide, regional or continental feral pigeon populations. NYSDEC Bureau of Wildlife staff concur with this assessment (B. Swift, pers. comm.).

English Sparrow Population Effects

English sparrows, or house sparrows, were introduced to North America from England in 1850 and have spread throughout the continent (Fitzwater 1994). English sparrows are found in nearly every habitat except dense forest, alpine, and desert environments. They prefer human-altered habitats, and are abundant on farms and in cities and suburbs (Robbins 1973). Breeding can occur in any month but is most common from March through August. Clutch sizes ranging from 3 to 7 eggs (Fitzwater 1994). English sparrows do not migrate. Studies have shown 90% of adult birds will stay within a 1 ¼ mile radius during nesting with flocks of juvenile and non-breeding adults moving 4 to 5 miles from nesting sites to seasonal feeding areas (Fitzwater 1994). Morality is highest during the first year of life, with few sparrows living longer than 5 years (Fitzwater 1994).

Breeding Bird Survey trend data from 1966-2003 indicate that the English sparrow population throughout the United States, Eastern BBS region, and New York has declined at an annual rate of -2.5%, -2.7%, and -2.1%, respectively (Sauer et. al 2004). With a relative abundance of 32.08 birds/10 mi^2, a total New York summer sparrow population could be estimated at approximately 174,600 birds. New York Christmas Bird Count data from 1966-2002 show a decreasing population trend for wintering populations of English sparrows throughout the state (National Audubon Society 2002). Based upon an anticipated increase in requests for services, WS's lethal management of English sparrows in New York would be expected to be no more than approximately 9,000 sparrows in any one year under the Proposed Action.

The change in farming practices may have been a factor for their recent population decrease. The considerable decline in small farms and associated disappearance of a multitude of small feed lots, stables and barns, may have reduced English sparrow populations, as these sites were a primary source of food in the early part of the 20th century. Ehrlich et al. (1988) suggested that English sparrow population declines might be linked to the dramatic decrease during the 20th century in the presence of horses as transport animals. Grain rich horse droppings were apparently a major food source for this species.

English sparrows are an introduced rather than a native species and are not protected by federal law, nor are they protected by New York state law. English sparrows are non-indigenous and often have negative impacts on and compete with native birds. These birds are considered by many wildlife biologists and ornithologists to be an undesirable component of North American

ecosystems. Any reduction in English sparrow populations in North America, even to the extent of complete eradication, could be considered a beneficial impact to native bird species.

Based on the above information, WS BDM activities should have minimal effects on local, statewide, regional or continental English sparrow populations. NYSDEC Bureau of Wildlife staff concurs with this assessment (B. Swift, pers. comm.).

American Crow and Fish Crow Population Effects

Crows are found in both urban and rural environments and in New York oftentimes form large communal roosts in city and suburban areas. They commonly use woodlots, wooded areas along streams and rivers, farmlands, orchards, parks and suburban areas (Johnson 1994). American crows have a wide range and are extremely abundant, being found widely distributed over much of North America, including most of the United States (National Audubon Society 2000, Johnson 1994). Fish crows primarily inhabit the coastal areas of the eastern and southeastern U.S. (Johnson 1994). Historically, crow populations have benefited from agricultural development because of grains available as a food supply. Crows typically roost in trees. A combination of food supply and tree availability is favored by crows. In some areas where abundant food and roosting sites are available, large flocks of crows will concentrate. Winter roosting concentrations of crows occur in areas that have favorable roost sites and abundant food sources (Johnson 1994). In relation to this type of habitat, crows may affect the local agriculture trade. In some situations, large flocks of crows may become a factor in spreading disease. Crows may commonly fly 6 to 12 miles from a roost each day to feed (Johnson 1994).

Crows begin nesting in early spring with average clutch sizes ranging from 4 to 6 eggs (Johnson 1994). The young of the year remain with their adult parents throughout the summer. Later in the year the family group may join other groups to form large groups of birds. These larger groups often migrate in late fall to early winter (Johnson 1994). During the fall crows in their northern ranges migrate south and generally winter south of the Canada-U.S. border (Johnson 1994). In the U.S., some crow roosts may reach a half-million birds or greater in size (National Audubon Society 2000, Johnson 1994). In New York, crow roosts consisting of tens of thousands of birds are a common occurrence throughout the fall and winter months. American crow populations increased drastically after protection from the Migratory Bird Treaty Act in 1972, but it could be suppressed now due to West Nile Virus. Populations tend to be densest and increasing most rapidly in urban areas of North America (Marzluff et al. 2001). Few crows in the wild live more than 4 to 6 years (Johnson 1994).

BBS trend data from 1966-2003 indicate that American crow populations have been increasing throughout the United States, the Eastern BBS region, and New York at an annual rate of 1.3%, 1.2%, and 1.4%, respectively (Sauer et al. 2004). With a relative abundance of 34.72 birds/10 mi^2, a total New York summer American crow population could be estimated at approximately 187,500 birds. New York Christmas Bird Count data from 1966-2003 show an increasing population trend for wintering populations of American crows throughout the state (National Audubon Society 2002).

BBS trend data from the 1966-2003 indicate that fish crow populations have been increasing throughout the United States, the Eastern BBS region, and New York at an annual rate of 1.1%, 0.9%, and 20.7%, respectively (Sauer et al. 2004). With a relative abundance of 0.15 birds/10 mi^2, a total New York summer fish crow population could be estimated at approximately 800 birds. New York Christmas Bird Count data from 1966-2003 show a stable population trend for wintering populations of fish crows throughout the state (National Audubon Society 2002).

Crow populations are healthy enough, and the problems they cause great enough, that the USFWS has established a standing depredation order for use by the public. Under this "order" (50 CFR 21.43), no federal permit is required by anyone to remove crows if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

The USFWS, as the agency with management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on crow populations would have no significant adverse impact on the quality of the human environment.

Crows are a bird species that may be harvested during the regulated hunting season in New York. Crow hunting seasons are determined by NYSDEC in accordance with USFWS guidelines. In New York, the season is typically open Friday through Monday (4 days a week) from early September until late March, with no daily bag limits. Crow hunters do not need to be registered in the Harvest Information Program (HIP), which provides the USFWS with a national registry of migratory bird hunters from which they can select participants for harvest surveys. Therefore no reliable hunter harvest information is available on the number of crows that are annually harvested by hunters in New York.

Based upon an anticipated increase in requests for services, WS's lethal management of crows in New York would be expected to be no more than approximately 30,000 birds in any one year under the Proposed Action. WS BDM activities would affect both breeding and migratory crow populations.

Based on the above information and USFWS oversight, WS BDM activities should have minimal effects on local, statewide, regional or continental crow populations. NYSDEC Bureau of Wildlife staff concurs with this assessment (B. Swift, pers. comm.).

4.1.1.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would not kill any target bird species because no lethal methods would be used. Although WS lethal take of target birds would not occur, it is likely that without WS conducting some level of lethal BDM activities; private BDM efforts would increase, leading to potentially similar or even greater effects on target species populations than the Proposed Action. For the same reasons shown in the population effects analysis in Section 4.1.1.2, however, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. DRC-1339 and the tranquilizer Alpha-Chloralose, if it becomes registered for use in NY, would only be available for use by WS employees and not be available for use under this alternative. Effects and hypothetical risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 1, but less than Alternative 4.

4.1.1.4 Alternative 4: No Federal WS Bird Damage Management

Under this alternative, WS would have no impact on target bird populations in the State. Private efforts to reduce or prevent depredations could increase which could result in effects on target species populations to an unknown degree. Effects on target species under this alternative could be the same, less, or more than those of the proposed action depending on the level of effort expended by private persons. For the same reasons shown in the population effects analysis in section 4.1.1.2, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. DRC-1339 and the tranquilizer Alpha-Chloralose, should it become registered for use in NY, would only be available for use by WS employees and therefore would not be available for private use under this alternative.

4.1.2 Effects on Other Wildlife Species, including T&E Species

4.1.2.1 Alternative 1: Technical Assistance Only

Alternative 1 would not allow any WS direct operational BDM in New York. Non-target or T&E species would not be impacted by WS activities from this alternative. Technical assistance or self-help information would be provided at the request of producers and others. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 4, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods, leading to greater take of non-target wildlife than under the proposed action. Impacts to non-target species could be similar or greater than the proposed action dependent upon the skills and abilities of the person implementing control measures.

It is hypothetically possible that, similar to Alternative 3 and 4, frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including some T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.1.2.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Adverse Effects on Non-target (non-T&E) Species. Direct impacts on nontarget species occur if WS program personnel were to inadvertently kill, injure, or harass animals that are not target species. In general, these impacts result from the use of methods that are not completely selective for target species. WS take of non-target species during BDM activities is expected to be extremely low to non-existent. During the last five fiscal years (1999-2003) only five individual non-target birds have been killed. If take of non-target species would occur, these occurrences are rare and should not affect the overall populations of any species. Mitigation measures designed and implemented to avoid adverse effects on non-target species are described in Chapter 3.

WS personnel are experienced and trained in wildlife identification, and to select the most appropriate methods for taking targeted animals and excluding nontarget species. Non-target species are usually not affected by WS's non-lethal management methods, except for the occasional scaring from harassment devices. In these cases, affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. Any non-target species captured in a live trap would be released unharmed on site.

No adverse impacts from the use of registered pesticides and repellents are anticipated. Any operational uses of BDM chemicals would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations that are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on non-target species populations. Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

Although it is possible that some non-target birds may be unknowingly killed by use of DRC-1339, the method of application is designed to minimize or eliminate that risk. For example, DRC-1339 treated bait is only applied after a period of pre-baiting with untreated bait material and when non-target birds are not observed coming to feed at the site. Furthermore, the inherent safety features of DRC-1339/Starlicide® use that precludes or minimize hazards to birds, mammals, and plants are described in Appendix B and in a formal risk assessment in the ADC Final EIS (USDA 1997, Appendix P). Those measures and characteristics should assure there would be no adverse effects on mammalian or bird scavengers from the proposed action.

While every precaution is taken to safeguard against taking non-target birds, changes in local flight patterns and other unanticipated events can result in the incidental take of unintended species. These occurrences are rare and should not affect the overall populations of any species under the current program.

Beneficial Effects on Non-target Species. This alternative has the greatest possibility of reducing interspecific nest competition of European starlings, house sparrows, and brown-headed cowbirds on native wildlife species.

T&E Species Effects. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. Mitigation measures to avoid T&E effects are described in Chapter 3 (Subsection 3.4.2.2). WS has consulted with the USFWS under Section 7 of the ESA concerning potential impacts of BDM methods on T&E species and has obtained a Biological Opinion (USDI 1992). For the full context of the Biological Opinion, see Appendix F of the ADC Final EIS (USDA 1997).

WS has obtained and reviewed the USFWS list of T&E species for NY (see Appendix C) and has determined that the proposed BDM program will not adversely affect the following federally listed species in New York: Gray wolf (Canis lupis monstrabilis), Indiana bat (Myotis socalis), Eskimo curlew (Numenius boralis), piping plover (Charadrius melodus), Roseate tern (Sterna dougallii), Leatherback sea turtle (Dermochelys coriacea), Shortnose sturgeon (Acipenser brevirostrum), Fat pocketbook (Potamilus capax), Northern monk's hood (Aconitum noveboracense), and Small whorled pogonia (Isotria medeoloides). This determination is based on the conclusions made by the FWS during their 1992 programmatic consultation of WS activities and subsequent Biological Opinion (USDA 1997, Appendix F). The USFWS determined that the management activities being utilized for WS BDM are not likely to adversely affect these listed species. Furthermore, WS has determined that the use of BDM methods will have no effect on those T&E species not included in the 1992 Biological Opinion or their critical habitats. In addition, WS has determined that the use of Alpha-Chloralose and lasers will have no effect on any listed T&E species.

As stated in the 1992 B.O., the USFWS has determined that the only BDM method that might adversely affect the bald eagle was above ground use of strychnine treated bait for "nuisance birds." Strychnine is no longer registered for above ground use and would not be used by WS for BDM in the State. DRC-1339/Starlicide® poses no primary hazard to eagles because eagles do not eat grain or other bait materials on which this chemical might be applied during BDM, and further, because eagles are highly resistant to DRC-1339. Up to 100 mg doses were force fed to captive golden eagles with no mortality or adverse effects noted other than regurgitation and head-shaking (Larsen and Dietrich 1970). Secondary hazards to raptors from DRC-1339/Starlicide® and Avitrol® are low to nonexistent (see Appendix B). Therefore, WS BDM in New York is not likely to adversely affect bald eagles.

The USFWS published the final rule to list the Canada lynx on March 24, 2000 (Federal Register, 50 CFR Part 17). The Final Rule identifies the listed population as the "U.S. District Population Segment" which occurs or historically occurred in forested portions of the States of Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, and Wisconsin. WS wildlife biologists consulted on the Canada lynx with USFWS in Regions 3 and 5 in March 2001. The USFWS (letter from L. Lewis, USFWS, Acting Assistant Regional Director to G. Larson, WS Eastern Regional Director, May 9, 2001) determined that, "Canada lynx are unlikely to be affected by using guard dogs, scare devices, oral rabies vaccine, and shooting." While the oral rabies vaccine and the use of dogs are not methods identified by the NY WS program for use in bird damage management, the other methods have been identified for potential use. This letter states that a "not likely to adversely affect" determination is appropriate for APHIS-WS operational programs, including those in New York.

WS has obtained and reviewed the list of New York State listed T&E species, species of concern, and species of special interest and has determined that the proposed WS BDM program will not

adversely affect any of the species listed in New York. NYSDEC Bureau of Wildlife staff concurs with this determination (B. Swift, pers. comm.).

Mitigation measures to avoid T&E effects are described in Chapter 3 (Subsection 3.5.2) and are also described in Subsection 4.1.2 of this chapter. The inherent safety features of DRC-1339/Starlicide® and Avitrol® use that preclude or minimize hazards to mammals and plants are described in Appendix B and in a formal risk assessment in the ADC Final EIS (USDA 1997, Appendix P). Those measures and characteristics should assure there would be no jeopardy to T&E species or adverse effects on mammalian or non-T&E bird scavengers from the proposed action.

4.1.2.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS lethal take of non-target animals would hypothetically be less than that of the proposed action because no lethal control actions would be taken by WS. Non-target species are usually not affected by WS's non-lethal management methods, except for the occasional scaring from harassment devices. In these cases, affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action. Impacts of WS use of non-lethal methods would be similar to the proposed action.

However, if bird damage problems were not effectively resolved by non-lethal control methods, members of the public may resort to other means of lethal control such as the use of shooting or illegal use of chemical toxicants. This could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including T&E species. Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.1.2.4 Alternative 4: No Federal WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. There would be no impact on non-target or T&E species by WS BDM activities from this alternative. However, private efforts to reduce or prevent depredations could increase which could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than under the proposed action. Impacts to non-target species could be similar or greater than the proposed action dependent upon the skills and abilities of the person implementing control measures.

It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could impact local non-target species populations, including some T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.1.3 Effects on Human Health and Safety

4.1.3.1 Safety and Efficacy of Chemical Methods

Alternative 1: Technical Assistance Only

Alternative 1 would not allow any direct operational BDM assistance by WS in the State. WS would only provide advice and, in some cases, equipment or materials (i.e., by loan or sale) to other persons who would then conduct their own damage management actions. Concerns about human health risks from WS' use of chemical BDM methods would be alleviated because no such use would occur. DRC-1339 and Alpha-Chloralose, should it become registered for use in New

York, are only registered for use by WS personnel and would not be available for use by private individuals.

Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and leading to a greater risk than the Proposed Action alternative. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical BDM methods use should be less than under Alternative 4. Commercial pest control services would be able to use Avitrol® and Starlicide®, should the chemical become registered for use in NY, and such use would likely occur to a greater extent in the absence of WS' assistance. Use of Avitrol® and Starlicide® in accordance with label requirements should preclude any hazard to members of the public. Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS' controlled use of DRC- 1339 and Avitrol®, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the Proposed Action alternative.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

DRC-1339 (Starlicide®). DRC-1339 is the primary lethal chemical BDM method that would be used under the proposed program alternative. Some concern has been generated by a few members of the public that unknown, but significant, risks to human health may exist from DRC-1339 used for BDM.

This chemical is one of the most extensively researched and evaluated pesticides ever developed. Over 30 years of studies have demonstrated the safety and efficacy of this compound. Appendix B provides more detailed information on this chemical and its use in BDM. Factors that virtually eliminate any risk of public health problems from use of this chemical are:

- Its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops.
- DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours, which means that treated bait material generally is nearly 100% broken down within a week.
- It is more than 90% metabolized in target birds within the first few hours after they consume the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people.
- Application rates are extremely low (less than 0.1 lb. of active ingredient per acre) (EPA 1995).
- A human would need to ingest the internal organs of birds found dead from DRC-1339 to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur.
- The EPA has concluded that, based on mutagenicity (the tendency to cause gene mutations in cells) studies, this chemical is not a mutagen or a carcinogen (i.e., cancer-causing agent) (EPA 1995). Notwithstanding, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.

The above analysis indicates that human health risks from DRC-1339 or Starlicide® use would be virtually nonexistent under any alternative.

Avitrol® (4-Aminopyridine). Avitrol is another chemical method that might be used by WS in BDM. Appendix B provides more detailed information on this chemical.

Avitrol® is available as a prepared grain bait mixture or as a powder. It is formulated in such a way that ratios of treated baits to untreated baits are no greater than 1:9. Factors that virtually eliminate health risks to members of the public from use of this product as an avicide are:

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (EXTOXNET 1996). Therefore, little of the chemical remains in killed birds to present a hazard to humans.

- A human would need to ingest the internal organs of birds found dead from Avitrol® ingestion to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur. Furthermore, secondary hazard studies with mammals and birds have shown that there is virtually no hazard of secondary poisoning.

- Although Avitrol® has not been specifically tested as a cancer-causing agent, the chemical was found not to be mutagenic in bacterial organisms (EPA 1997). Therefore, the best scientific information available indicates it is not a carcinogen. Notwithstanding, the extremely controlled and limited circumstances in which Avitrol is used would prevent exposure of members of the public to this chemical.

The above analysis indicates that human health risks from Avitrol® use would be virtually nonexistent under any alternative.

Other BDM Chemicals. Non-lethal BDM chemicals that might be used or recommended by WS would include repellents such as methyl or di-methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent; anthraquinone which is presently marketed as Flight Control™; Mesurol a repellent used to protect T&E species nests, should it become registered for use in NY; and the tranquilizer drug Alpha-Chloralose, should it become registered for use in NY. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before becoming registered by the EPA or Food and Drug Administration (FDA). Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

Alternative 3: Non-lethal Bird Damage Management Only by WS

Alternative 3 would not allow for any lethal methods to be used by WS in the State. WS could only implement or recommend non-lethal methods such as harassment, and exclusion devices and materials. Non-lethal methods could, however, include the tranquilizer drug Alpha-Chloralose, should it become registered for use in NY; and chemical repellents such as anthraquinone; Mesurol, should it become registered for use in NY; and methyl anthranilate which, although already considered safe for human consumption because it is artificial grape flavoring, might nonetheless raise concerns about human health risks. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before becoming registered by the EPA or FDA. Any operational use of chemical repellents and tranquilizer drugs would be in accordance with labeling requirements under FIFRA, state pesticide laws and

regulations, and FDA rules which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Excessive cost or ineffectiveness of non-lethal techniques could result in some entities rejecting WS' assistance and resorting to other means of BDM. Such means could include illegal pesticide uses. Commercial pest control services would be able to use Avitrol® and Starlicide®, should it become registered for use in NY, and such use would likely occur to a greater extent in the absence of WS lethal BDM assistance. Use of Avitrol® and Starlicide® in accordance with label requirements should preclude any hazard to members of the public. Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS' controlled use of DRC-1339 and Avitrol®, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the proposed alternative.

Alternative 4: No Federal WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS' use of chemical BDM methods would be alleviated because no such use would occur. DRC- 1339 is only available for use by WS personnel and would not be available for use by private individuals.

Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Commercial pest control services would be able to use Avitrol® and Starlicide®, should it become registered for use in NY, and such use would likely occur to a greater extent in the absence of WS' assistance. Use of Avitrol® and Starlicide® in accordance with label requirements should preclude any hazard to members of the public. However, hazards to humans and pets could be greater under this alternative if other chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS' controlled use of DRC- 1339 and Avitrol®, could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program alternative.

4.1.3.2 Impacts on Human Safety of Non-chemical BDM Methods

Alternative 1: Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any non-chemical BDM methods. Risks to human safety from WS' use of firearms, traps and pyrotechnics would hypothetically be lower than the Proposed Action alternative, since WS would not be conducting direct control activities. Hazards to humans and property could be greater under this alternative if personnel conducting BDM activities using non-chemical methods are poorly or improperly trained.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Non-chemical BDM methods that might raise safety concerns include shooting with firearms, traps and harassment with pyrotechnics. Firearms are only used by WS personnel who are experienced in handling and using them. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. A formal risk assessment of WS' operational management methods, including firearms, traps and pyrotechnics, found that risks to human safety were low

(USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS' use of these methods is expected.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, non-chemical BDM methods that might raise safety concerns include shooting with firearms when used as a harassment technique, traps and harassment with pyrotechnics. Firearms are only used by WS personnel who are experienced in handling and using them. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. A formal risk assessment of WS' operational management methods, including firearms, traps and pyrotechnics, found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS' use of these methods is expected.

Alternative 4: No Federal WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS' use of non-chemical BDM methods would be alleviated because no such use would occur. The use of firearms, traps or pyrotechnics by WS would not occur in BDM activities in the State. However, private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Commercial pest control services would be able to use pyrotechnics, traps or firearms in BDM programs and this activity would likely occur to a greater extent in the absence of WS' assistance. Hazards to humans and property could be greater under this alternative if personnel conducting BDM activities using non-chemical methods are poorly or improperly trained.

4.1.3.3 Impacts on Human Health and Safety from Birds

Alternative 1: Technical Assistance Only

With WS technical assistance but no direct management, entities requesting BDM assistance for human health concerns would either take no action, which means the risk of human health problems would likely continue or increase in each situation as bird numbers are maintained or increased; or implement WS recommendations for non-lethal and lethal control methods. Potential impacts would be variable. Individuals or entities that implement management actions may or may not have the experience necessary to efficiently and effectively conduct an effective BDM program. In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. The potential risk would be less likely under this alternative than Alternative 4 when people requesting assistance receive and accept WS technical assistance recommendations.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

People are concerned with potential injury, illness, and loss of human life resulting from injurious bird species. An Integrated BDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing this risk. All BDM methods could possibly be implemented and recommended by WS.

An IWDM approach reduces damage or threats to public health or safety for people who would have no relief from such damage or threats if non-lethal methods were ineffective or impractical. As discussed in Chapter 1, birds are a threat to aviation safety and can also carry or transmit diseases to humans, which can adversely affect human health. In most cases, it is difficult to conclusively prove that birds were responsible for transmission of individual human cases or outbreaks of bird-borne diseases. Nonetheless, certain requesters of BDM service may consider this risk to be unacceptable and may request such service primarily for that reason. In such cases,

BDM, either by lethal or non-lethal means, would, if successful, reduce the risk of bird-borne disease transmission at the site for which BDM is requested.

In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. In such cases, lethal removal of the birds may actually be the best alternative from the standpoint of overall human health concerns in the local area. However, if WS is providing direct operational assistance in relocating birds, coordination with local authorities who may assist in monitoring the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods in providing assistance with bird damage problems. WS would not be able to implement lethal management actions in those situations where non-lethal methods are not effective at reducing damage to acceptable levels. In these situations bird damage would likely remain the same or possibly increase unless cooperators implemented their own BDM program. The success or failure of the use of non-lethal methods can be quite variable. In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to urban roosting sites not previously affected. Some requesting entities, such as city government officials, would reject WS assistance for this reason and would likely seek to achieve bird control by other means. However, if WS is providing direct operational assistance in relocating birds, coordination with local authorities who may assist in monitoring the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

Alternative 4: No Federal WS Bird Damage Management

With no WS assistance, cooperators would be responsible for developing and implementing their own BDM program. Cooperator efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential of not reducing bird hazards, than under the proposed action. In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. Under this alternative, human health problems could increase if private individuals were unable to find and implement effective means of controlling birds that cause damage problems.

4.1.4 Impacts to Stakeholders, including Aesthetics

4.1.4.1 Effects on Human Affectionate Bonds with Individual Birds and on Aesthetic Values of Wild Bird Species

Alternative 1: Technical Assistance Only

Under this alternative, WS would not conduct any direct operational BDM, but would still provide technical assistance or self-help advice to persons requesting assistance with bird damage. Those who oppose direct operational assistance in wildlife damage management by the government, but favor government technical assistance, would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS' activities under this alternative because the individual birds would not be killed by WS. However, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the Proposed Action alternative.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Those who routinely view or feed individual birds, such as feral domestic pigeons, would likely be disturbed by removal of such birds under the current program. WS is aware of such concerns and takes these concerns into consideration to mitigate effects. WS may be able to mitigate such concerns by leaving certain birds that have been identified by interested individuals.

Some members of the public have expressed opposition to the killing of any birds during BDM activities. Under this Proposed Action alternative, some lethal control of birds would occur and these persons would be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS' lethal control activities. Lethal control actions would generally be restricted to local sites and to small percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would, therefore, continue to remain available for viewing by persons with that interest.

Lethal removal of birds from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to public access. The ability to view and interact with birds at these sites is usually either restricted to viewing from a location outside boundary fences or is forbidden.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would not conduct any lethal BDM, but may conduct harassment of birds that are causing damage. Some people who oppose lethal control of wildlife by the government, but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by the death of individual birds under this alternative, but might oppose dispersal or translocation of certain birds. WS may be able to mitigate such concerns by leaving certain birds that have been identified by interested individuals. In addition, the abundant populations of target bird species in urban environments would enable people to continue to view them and to establish affectionate bonds with individual wild birds. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the proposed action alternative.

Alternative 4: No Federal WS Bird Damage Management

Under this alternative, WS would not conduct any lethal removal of birds nor would the program conduct any harassment of birds. Those in opposition of any government involvement in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS' activities under this alternative. However, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the proposed action alternative.

4.1.4.2 Effects on Aesthetic Values of Property Damaged by Birds

Alternative 1: Technical Assistance Only

Under this alternative, the lack of operational assistance in reducing bird problems could result in an increase of potential adverse affects on aesthetic values. Potential impacts would be variable dependent upon the skills and abilities of the person implementing control measures. Although technical support might lead to more selective use of control methods than that which might occur under Alternative 4, individuals that implement management actions may or may not have the experience necessary to efficiently and effectively conduct an effective BDM program. However, potential adverse affects would likely be less than as those under Alternative 4, since WS would be providing technical assistance.

Relocation of nuisance roosting or nesting populations of birds (e.g., blackbird/starling roosts) through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. If WS has only provided technical assistance to local residents or municipal authorities, coordination with local authorities to monitor the birds' movements to assure the birds do not reestablish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

An IWDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing wildlife damage. All BDM methods could possibly be implemented and recommended by WS.

Under this alternative, WS operational assistance in reducing bird problems, in which droppings from the birds cause an unsightly mess, would improve aesthetic values of affected properties. In addition, individuals objecting to the presence of invasive nonnative species, such as European starlings, domestic feral pigeons, and English sparrows, and whose aesthetic enjoyment of other birds is diminished by the presence of such species, will be positively affected by programs which result in reductions in the presence of such birds.

Relocation or dispersal of nuisance roosting or nesting populations of birds (e.g., blackbird/starling roosts) by harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities who may assist in monitoring the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would be restricted to non-lethal methods only. The success or failure of non-lethal methods can be quite variable. Assuming property owners would choose to allow and pay for the implementation of these non-lethal methods, this alternative could result in birds relocating to other sites where they would likely cause or aggravate similar problems for other property owners. Thus, this alternative would likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the Proposed Action alternative.

Relocation or dispersal of nuisance roosting or nesting populations of birds (e.g., blackbird/starling roosts) by harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities who may assist in monitoring the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

Alternative 4: No Federal WS Bird Damage Management

Under this alternative, the lack of any operational or technical assistance in reducing bird problems would mean aesthetic values of some properties would continue to be adversely affected if the property owners were not able to achieve BDM some other way. Potential impacts would be variable dependent upon the skills and abilities of the person implementing control measures. Individuals that implement management actions may or may not have the experience necessary to efficiently and effectively conduct an effective BDM program. In many cases, this type of aesthetic "damage" would worsen because property owners would not be able to resolve their problems and bird numbers would continue to increase.

Relocation of nuisance roosting or nesting population of birds (e.g., blackbird/starling roosts) through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. Coordination of dispersal activities by local residents with local authorities to monitor the birds' movements to assure the birds do not reestablish in other

undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

4.1.5 Humaneness and Animal Welfare Concerns of Methods Used

4.1.5.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would provide self-help advice only. Thus, lethal methods, viewed as inhumane by some persons, would not be used by WS. Without WS direct operational assistance, it is expected that many requesters of BDM would reject non-lethal recommendations or would not be willing to pay the extra cost of implementing and maintaining them and would seek alternative lethal means. Similar to Alternative 3, DRC-1339 would no longer be available as it is only registered for use by or under the direct supervision of WS personnel. Commercial pest control services would be able to use Avitrol® and Starlicide®, should it become registered for use in NY, and such use would likely occur to a greater extent in the absence of WS lethal BDM assistance. The use of Avitrol® may be viewed by many persons as less humane than DRC-1339 or Starlicide® because of the distress behaviors that it causes. Improper or illegal use of both chemicals would likely be viewed as inhumane by the public. Shooting, live trapping/capture and euthanization by decapitation, cervical dislocation, or CO_2 gas could be used by non-WS entities and, similar to the current program alternative, would be viewed by some persons as inhumane. Overall, BDM under this alternative would likely be somewhat less humane than the Proposed Action alternative, but slightly more humane than Alternative 4.

4.1.5.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Under this alternative, BDM methods viewed by some persons as inhumane would be used in by WS. These methods would include live capture and euthanasia, shooting, and toxicants/chemicals such as DRC-1339, Starlicide® and Avitrol®.

Shooting, when performed by experienced professionals, usually results in a quick death for target birds. Occasionally, however, some birds are initially wounded and must be shot a second time or must be caught by hand and then dispatched or euthanized. Some persons would view shooting as inhumane.

The primary lethal chemical BDM method that would be used by WS under this alternative would be DRC-1339 (see discussion in Appendix B). This chemical causes a quiet and apparently painless death resulting from uremic poisoning and congestion of major organs (Decino et al. 1966). The birds become listless and lethargic, and a quiet death normally occurs in 24 to 72 hours following ingestion. However, the method appears to result in a less stressful death than that which probably occurs by most natural causes, such as by disease, starvation, or predation. For these reasons, WS considers DRC-1339 use to be a relatively humane method of lethal BDM. However, despite the apparent painlessness of the effects of this chemical, some persons will view any method that takes a number of hours to cause death as inhumane and unacceptable. Starlicide® would have similar impacts as DRC-1339.

The chemical Avitrol® repels birds by poisoning a few members of a flock, causing them to become hyperactive (see discussion in Appendix B). Their distress calls generally alarm the other birds and cause them to leave the site. Only a small number of birds need to be affected to cause alarm in the rest of the flock. The affected birds generally die. In most cases where Avitrol® is used, only a small percentage of the birds are affected and killed by the chemical with the rest being merely dispersed. In experiments to determine suffering, stress, or pain in affected animals, Rowsell et al. (1979) tested Avitrol® on pigeons and observed subjects for clinical, pathological, or neural changes indicative of pain or distress. None were observed. Conclusions of the study were that the chemical met the criteria for a humane pesticide. Notwithstanding, some persons would view Avitrol® as inhumane treatment of the birds that are affected by it based on the birds' distress-like behavior.

Occasionally, birds captured alive by use of the tranquilizer Alpha-Chloralose, traps, by hand, or with nets would be euthanized. The most common method of euthanization would be by decapitation, cervical dislocation, or CO_2 gas which are described and approved by AVMA as humane euthanasia methods (Beaver et al. 2001). Even though most people would view AVMA approved euthanasia methods as humane, some persons may still view these methods as inhumane.

4.1.5.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, lethal methods, viewed as inhumane by some persons, would not be used by WS. However, it is expected that many requesters of BDM assistance would reject non-lethal methods recommended by WS and/or would not be willing to pay the extra cost of implementing and maintaining them and would seek alternative lethal means. DRC-1339 would not be available to non-WS entities; however, Avitrol® and Starlicide®, if registered for use in New York, would be legal for use by certified pest control operators. Avitrol® could be used or recommended by WS under this alternative. Avitrol® would most likely be viewed as less humane than DRC-1339 or Starlicide® because of the distress behaviors that it causes. Shooting, live trapping/capture and euthanization by decapitation, cervical dislocation, or CO_2 gas could be used by non-WS entities and, similar to the current program alternative, would be viewed by some persons as inhumane.

4.1.5.4 Alternative 4: No Federal WS Bird Damage Management

Under this alternative, methods viewed as inhumane by some persons would not be used by WS. Similar to Alternatives 1 and 3, DRC-1339 would no longer be available for use since it is only registered for use by or under the direct supervision of WS personnel. However, Avitrol® and Starlicide®, if registered for use in NY, would be legal for use by certified pest control operators. Avitrol® would most likely be viewed as less humane than DRC-1339 or Starlicide® because of the distress behaviors that it causes. Shooting, live trapping/capture and euthanization by decapitation, cervical dislocation, or CO_2 gas could be used by non-WS entities and, similar to the proposed action alternative, would be viewed by some persons as inhumane.

4.2 CUMULATIVE IMPACTS OF BDM METHODS BY ALTERNATIVE

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternatives 1, 2, and 3, WS would address damage associated with birds in a number of situations throughout the State. The WS BDM program would be the primary federal program with BDM responsibilities; however, some state and local government agencies may conduct BDM activities in New York as well. Through ongoing coordination with these agencies, WS is aware of such BDM activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct BDM activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct BDM activities in the same area. The potential cumulative impacts analyzed below could occur either as a result of WS BDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

Bird Damage Management methods used or recommended by the WS program in New York will likely have no cumulative adverse effects on target and non-target wildlife populations. WS limited lethal take of target bird species is anticipated to have minimal impacts on target bird populations in New York, the region and the U.S. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal to non-existent.

Cumulative Impact Potential from Chemical Components

BDM programs which include the use of pesticides as a lethal population management component may have the greatest potential for cumulative impacts on the environment as such impacts relate to deposit of chemical residues in the physical environment and environmental toxicosis. The avicides, DRC-1339 and Starlicide®, should it become registered for use in New York, and the frightening agent, Avitrol®, are the only chemicals that may be used or recommended by the New York WS BDM program for the purpose of obtaining lethal effects on birds. These chemicals have been evaluated for possible residual effects which might occur from buildup of the chemicals in soil, water, or other environmental sites.

> ***DRC-1339*** exhibits a low persistence in soil or water, and bioaccumulation of the chemical is unlikely (USDA 1997). Additionally, the relatively small quantities of the chemical that may be used in BDM programs, the chemical's instability which results in speedy degradation of the product (see Appendix B), and application protocol used in WS programs further reduces the likelihood of any environmental accumulation. DRC-1339 is not used by any other entities in New York.
>
> ***Starlicide®*** is similar to DRC-1339 used in feedlots; however, it contains 0.1% DRC-1339 (USDA 1997, Appendix P). Therefore, if registered for use, the cumulative impact potential from Starlicide® use would be similar to DRC-1339.
>
> ***Avitrol®*** may be used or recommended by the New York WS program. Most applications would not be in contact with soil, applications would not be in contact with surface or ground water, and uneaten baits will be recovered and disposed of according to EPA label specifications. Avitrol® exhibits a high persistence in soil and water but, according to literature, does not bio-accumulate (USDA 1997 and EXTOXNET 2000). Because of Avitrol®'s characteristic of binding to soils, it is not expected to be present in surface or ground water as a result of its use on land (EPA 1980). A combination of chemical characteristics and baiting procedures used by WS would reduce the likelihood of environmental accumulation of Avitrol® in potential future use in WS BDM programs in New York. The EPA has not required studies on the fate of Avitrol® in the soil because, based on use patterns of the avicide, soil residues are expected to be low (EPA 1980).

Based on use patterns; the chemical and physical characteristics of DRC-1339, Starlicide®, and Avitrol®; and factors related to the environmental fate of these pesticides, no cumulative impacts are expected from the lethal chemical components used in the WS BDM program in New York.

Non-lethal chemicals may also be used in the WS BDM program in New York. These non-lethal chemicals are discussed in Subsection 3.3.4 and in Appendix B. Characteristics of these chemicals and use patterns from WS programs indicate that no significant cumulative impacts related to environmental fate are expected from their use in WS BDM programs in New York.

Cumulative Impact Potential from Non-chemical Components

Non-chemical methods of the WS BDM program in New York may include exclusion through use of various barriers; habitat modification of structures or vegetation; live trapping and translocation or euthanasia of birds; harassment dispersal of birds or bird flocks; and shooting of some birds.

Because shooting may be considered as a component of the non-chemical WS BDM program in New York, the deposition of lead shot in the environment is a factor considered in this EA.

> ***Lead Shot.*** Threats of lead toxicosis to waterfowl from the deposition of lead shot in waters where such species fed were observed more than one hundred years ago (Sanderson and Belrose 1986). As a result of discoveries made regarding impacts to several species of ducks and geese, federal restrictions were placed on the use of lead shot for waterfowl hunting in 1991. "Beginning September 1, 1991, the contiguous 48 United States, and the States of Alaska and Hawaii, the Territories of Puerto Rico and the Virgin Islands, and the territorial waters of the United States, are designated for the purpose of Sec. 20.21 (j) as nontoxic shot zones for hunting waterfowl, coots, and certain other species. 'Certain other species' refers to those species, other

than waterfowl or coots, affected by reason of being included in aggregate bags and concurrent seasons."

All WS BDM shooting activities conform to federal, state and local laws. If activities are conducted near or over water, WS will use steel shot during activities as steel shot is required by NYSDEC when shooting over water in all of New York State. Consequently, no deposition of lead in water will occur as a result of WS BDM actions in New York. Additionally, WS will evaluate other BDM actions which entail the use of shot on a case by case basis to determine if deposition of lead shot poses any risk to non-target animals, such as raptors, scavengers, domestic livestock, etc. If such risk exists, WS will use nontoxic shot in those situations. Therefore, cumulative impacts are not likely to occur if toxic shot/shooting is used as a possible method in the New York WS BDM program.

Roost Harassment/Relocation. Some potential exists for cumulative impacts to human health and safety related to the harassment of roosting bird flocks such as American crows, blackbirds, and European starlings in urban environments. If birds are dispersed from one site and relocated to another where human exposure to concentrations of bird droppings over time occurs, human health and safety could be threatened. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

SUMMARY

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the Proposed Action, the lethal removal of birds by WS would not have a significant impact on overall pigeon, starling, sparrow, blackbird, or crow populations in New York, but some local reductions may occur. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1, 2, and 3, since only trained and experienced wildlife biologists/specialists would conduct and recommend BDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1, 2, and 3 and conduct their own BDM activities, and when no WS assistance is provided in Alternative 4. In all four Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS' participation in BDM activities on public and private lands within the state of New York, the analysis in this EA indicates that WS Integrated BDM program will no result in significant cumulative adverse impacts on the quality of the human environment. Table 4-1 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4-1. Summary of expected effects of each of the alternatives on each of the issues.

Issues	*Alternative 1 Technical Assistance Only*	*Alternative 2 Integrated Bird Damage Management Program (Proposed Action/No Action)*	*Alternative 3 Nonlethal BDM Only by WS*	*Alternative 4 No Federal WS BDM*
Effects on Target Bird Species	No effect by WS. Low effect - reductions in local starling, pigeon, blackbird, crow, and sparrow numbers by non-WS personnel likely; would not significantly affect state and regional populations.	Low effect - reductions in local starling, pigeon, blackbird, crow, and sparrow numbers; would not significantly affect state and regional populations	Low effect - reductions in local starling, pigeon, blackbird, crow, and sparrow numbers by non-WS personnel likely; would not significantly affect state and regional populations.	No effect by WS. Low effect - reductions in local starling, pigeon, blackbird, crow, and sparrow numbers by non-WS personnel likely; would not significantly affect state and regional populations
Effects on Other Wildlife Species, Including T&E Species	No effect by WS. Impacts by non-WS personnel would be variable.	Low effect - methods used by WS would be highly selective with very little risk to non-target species.	Low effect - methods used by WS would be highly selective with very little risk to non-target species.	No effect by WS. Impacts by non-WS personnel would be variable.
Effects on Human Health and Safety	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater potential of not reducing bird damage than under the proposed action.	The proposed action has the greatest potential of successfully reducing this risk. Low risk from methods used by WS.	Impacts could be greater under this alternative than the proposed action. Low risk from methods used by WS.	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater potential of not reducing bird damage than under the proposed action.
Aesthetic Enjoyment of Birds	Low to moderate effect. Local bird numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state starling, pigeon, blackbird, crow, and sparrow populations.	Low to moderate effect at local levels; Some local populations may be reduced; WS bird damage management activities do not adversely affect overall regional or state starling, pigeon, blackbird, crow, and sparrow populations.	Low to moderate effect. Local bird numbers in damage situations would remain high or possibly increase when non-lethal methods are ineffective unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state starling, pigeon, blackbird, crow, and sparrow populations.	Low to moderate effect. Local bird numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state starling, pigeon, blackbird, crow, and sparrow populations.
Aesthetic Damage Caused by Birds	Moderate to High effect - birds may move to other sites which can create aesthetic damage problems at new sites.	Low effect - bird damage problems most likely to be resolved without creating or moving problems elsewhere.	Moderate to High effect - birds may move to other sites which can create aesthetic damage problems at new sites. Less likely than Alt. 1 and 4.	High effect - bird problems less likely to be resolved without WS involvement. Birds may move to other sites which can create aesthetic damage problems at new sites
Humaneness Concerns of Methods Used	No effect by WS. Impacts by non-WS personnel would be variable.	Low to moderate effect - methods viewed by some people as inhumane would be used by WS.	Lower effect than Alt. 2 since only non-lethal methods would be used by WS	No effect by WS. Impacts by non-WS personnel would be variable.

CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

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APPENDIX A
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APPENDIX B

BIRD DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE OR RECOMMENDATION BY THE NEW YORK WILDLIFE SERVICES PROGRAM

NON-LETHAL, NON-CHEMICAL METHODS

Agricultural producer and property owner practices. These consist primarily of non-lethal preventive methods such as cultural methods and habitat modification. Cultural methods and other management techniques are implemented by the agricultural producer or property owners/managers. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practicality. These methods include:

> **Cultural methods.** Cultural methods may include altering planting dates so that crops are not young and vulnerable to damage when the damage-causing species are present, or the planting of crops that are less attractive or less vulnerable to such species. At feedlots or dairies, cultural methods generally involve modifications to the level of care or attention given to livestock, which may vary depending on the age and size of the livestock. Animal husbandry practices include, but are not limited to, techniques such as night feeding, indoor feeding, closed barns or corrals, removal of spilled grain or standing water, and use of bird proof feeders (Johnson and Glahn 1994).
>
> **Environmental/Habitat modification** can be an integral part of BDM. Wildlife production and/or presence is directly related to the type, quality, and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain bird species or to repel certain birds. In most cases, the resource or property owner is responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of BDM strategies at or near airports to reduce bird-aircraft strike hazards by eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport properties can be minimized through management of vegetation and water from areas adjacent to aircraft runways. Habitat management is often necessary to minimize damage caused by crows, blackbirds, and starlings that form large roosts during late autumn and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand.

Animal behavior modification. This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may involve use of scare tactics or fencing to deter or repel animals that cause loss or damage (Twedt and Glahn 1982). Some of the methods included in this category are:

- Bird-proof barriers
- Electronic guards
- Propane exploders
- Pyrotechnics
- Distress calls and sound producing devices
- Scare crows
- Mylar tape
- Lasers
- Eye-spot balloons

These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium-filled eye-spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective, but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Graves and Andelt 1987, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988).

Bird proof barriers can be effective, but are often cost-prohibitive as the aerial mobility of birds usually requires overhead barriers as well as peripheral fencing or netting. Exclusionary devices, adequate to stop bird movements, can also restrict movements of livestock, people and other wildlife (Fuller-Perrine and Tobin 1993). Overhead wire grids can deter crow use of specific areas where they are causing a nuisance (Johnson 1994). The birds apparently fear colliding with the wires and, thus, avoid flying into areas where the method has been employed. Netting can be used to exclude birds from a specific area by the placement of bird-proof netting over and around the specific resource to be protected. Exclusion may be impractical in most settings (e.g., commercial agriculture); however, it can be practical in small areas (e.g., personal gardens) or for high-value crops (e.g., grapes) (Johnson 1994). Although this alternative would provide short-term relief from damage, it may not completely deter birds from feeding, loafing, staging, or roosting at that site. The public often finds exclusionary devices, such as netting, unsightly and fear the devices will lower the aesthetic value of the neighborhood when used over personal gardens.

Auditory scaring devices such as propane exploders, pyrotechnics, electronic guards, scare crows, and audio distress/predator vocalizations are effective in many situations for dispersing damage-causing bird species. These devices are sometimes effective, but usually only for a short period of time before birds become accustomed and learn to ignore them (Arhart 1972, Rossbach 1975, Shirota and Masake 1983, Schmidt and Johnson 1984, Mott 1985, Bomford 1990, and Gorenzel and Salmon 1992). Williams (1983) reported an approximate 50% reduction in blackbirds at two south Texas feedlots as a result of pyrotechnics and propane cannon use. However, these devices are often not practical in dairy or feedlot situations because of the disturbance to livestock, although livestock can generally be expected to habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Visual scaring techniques such as the use of Mylar tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly give birds a visual cue that a large predator is present), flags, lasers, and effigies (scarecrows), are occasionally effective in reducing bird damage. Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, and Tobin et al. 1988). Birds quickly learn to ignore visual and other scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Lasers are a non-lethal technique recently evaluated by the USDA, APHIS, WS, National Wildlife Research Center (NWRC) to disperse double-crested cormorant roosts (Glahn et al. 2000). For best results and to disperse numerous birds from a roost, the laser is most effectively used in periods of low light, such as after sunset and before sunrise. In the daytime, the laser can also be used during overcast conditions or in shaded areas to move individual and small numbers of birds, although the effective range of the laser is much diminished. Moving the laser light through the tree branches rather than touching birds with the laser light elicited an avoidance response from cormorants (Glahn et al. 2000). During pen trials with lasers the cormorants were inconsistent in their response with some birds showing no response to the laser (Glahn et al. 2000). The lack of overt response by cormorants to lasers is not clearly understood, but suggests laser light is not an highly aversive agent (Glahn et al. 2000). Blackwell et al. (2002) tested lasers on several bird species and observed varied results among species. Lasers were ineffective at dispersing pigeons and mallard with birds habituating in approximately 5 minutes and 20 minutes, respectively (Blackwell et al. 2002). Canada geese reacted to the laser displaying neophobic avoidance to the approaching laser beam.

Vultures respond readily to lasers. In Florida, a roost of over 250 vultures in a residential neighborhood was dispersed after a laser was used there during 4 consecutive evenings. No habituation to the laser was noted. However, the birds returned 2 days later after laser harassment had ceased (M. Avery, NWRC, pers. commun.). At three other roosts, similar short-term responses were observed. It appears that lasers can provide short-term vulture control, but there long-term effectiveness remains to be determined. Similar to most other BDM tools, lasers are most effective when used as part of an integrated management program.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. Nest destruction is generally only applied when dealing with a single bird or very few birds. This method is used to

discourage birds from constructing nests in areas which may create nuisances for home and business owners. Heusmann and Bellville (1978) reported that nest removal was an effective, but time-consuming method because problem bird species are generally abundant and highly mobile and can easily return to damage sites from long distances. This method poses no imminent danger to pets or the public.

Egg addling/destruction is a method of suppressing reproduction in local nuisance bird populations by destroying egg embryos prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times, causing detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen (see *Egg oiling* below). Although WS does not commonly use egg addling or destruction, it is a valuable damage management tool and has proven effective in some applications.

Lure crops/alternate foods. When depredations cannot be avoided by careful crop selection or modified planting schedules, lure crops can sometimes be used to mitigate the loss potential. Lure crops are planted or left for consumption by wildlife as an alternative food source. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area.

NON-LETHAL, CHEMICAL METHODS

Avitrol® is a chemical frightening agent (repellent) that is effective in a single dose when mixed with untreated baits, normally in a 1:9 ratio. Avitrol®, however, is not completely non-lethal in that a small portion of the birds are generally killed (Johnson and Glahn 1994). Pre-baiting is usually necessary to achieve effective bait acceptance by the target species. This chemical is registered for use on pigeons, crows, gulls, blackbirds, starlings, and English sparrows in various situations. Avitrol® treated bait is placed in an area where the targeted birds are feeding. Usually, a few birds will consume the treated bait and become affected by the chemical. The affected birds then broadcast distress vocalizations and display abnormal flying behavior, thereby frightening the remaining flock away.

Avitrol® is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations where only a small portion of the individual grains carry the chemical. It can be used anytime of the year, but is used most often during winter and spring. Any granivorous bird associated with the target species could be affected by Avitrol®. Avitrol® is water soluble, but laboratory studies have demonstrated that Avitrol® is strongly absorbed onto soil colloids and has moderately low mobility. Biodegradation is expected to be slow in soil and water, with a half-life ranging from three to 22 months. However, Avitrol® may form covalent bonds with humic materials, which may serve to reduce its availability for intake by organisms from water. It is non-accumulative in tissues and is rapidly metabolized by many species (Schafer 1991).

Avitrol® is acutely toxic to avian and mammalian species; however, blackbirds are more sensitive to the chemical and there is little evidence of chronic toxicity. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning, and during field use only magpies and crows appear to have been affected (Schafer 1991). However, a laboratory study by Schafer et al. (1974) showed that magpies exposed to two to 3.2 times the published Lethal Dose (LD_{50}) in contaminated prey for 20 days were not adversely affected and three American kestrels that were fed contaminated blackbirds for seven to 45 days were not adversely affected. Some hazards may occur to predatory species consuming unabsorbed chemical in the GI tract of affected or dead birds (Holler and Shafer 1982, Schafer 1981). A formal Risk Assessment found no probable risk is expected for pets and the public, based on low concentrations and low hazards quotient value for non-target indicator species tested on this compound (USDA 1997, Appendix P).

Methyl anthranilate (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. Methyl anthranilate (MA) (artificial grape flavoring food additive) has been shown to be a promising repellent for many bird species (Dolbeer et al. 1993). Cummings et al. (1995) found effectiveness of MA declined significantly after 7 days. Belant et al. (1996) found MA ineffective as a bird grazing repellent, even when applied at triple the recommended label rate. MA is also under investigation as a potential bird taste repellent. MA may become available for use as a livestock feed additive (Mason et al. 1984; Mason et al. 1989). It is registered for applications to turf or to surface water areas used by unwanted birds. The material has

been shown to be nontoxic to bees (LD_{50} > 25 micrograms/bee[4]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[5]), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992; RJ Advantage, Inc. 1997). It has been listed as "Generally Recognized as Safe" (GRAS) by the FDA (Dolbeer et al. 1992).

Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb., with retreating required every 3-4 weeks (RJ Advantage, Inc. 1997). The cost of treating turf areas would be similar on a per acre basis. Also, MA completely degrades in about 3 days when applied to water (RJ Advantage, Inc. 1997), which indicates the repellent effect is short-lived.

Another potentially more cost-effective method of MA application is by use of a fog-producing machine (Vogt 1997). The fog drifts over the area to be treated and is irritating to the birds while being non-irritating to any humans that might be exposed. Fogging applications must generally be repeated 3-5 times after the initial treatment before the birds abandon a treatment site (Dr. P. Vogt, RJ Advantage, Inc., Pers. Comm. 1997). Applied at a rate of about .25 l./acre of water surface, the cost is considerably less than when using the turf or water treatment methods.

MA is also being investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or the FDA.

Mesurol was recently registered by WS to repel crows and ravens from the nests of T&E species. It could be used by WS only as a bird repellent to deter predation by crows on eggs of threatened or endangered species. Dimmick and Nicolaus (1990) showed breeding pairs of crows could be conditioned with aversive chemicals to avoid eggs. However, Avery and Decker (1994) observed increased consumption of eggs treated with higher doses of Mesurol by fish crows. Sullivan and Dinsmore (1990) reported bird nests greater than 700 meters from crow nests were relatively safe from crow predation, thus nests beyond 700 meters from active crow nests may not need to be treated.

WS would treat eggs similar in appearance as those eggs of the species needing protection. The active ingredient is injected into eggs which are placed in artificial nests or upon elevated platforms. Upon ingestion, birds develop post-ingestion malaise (Mason 1989) and crows develop an aversion to consuming similar looking eggs (Dimmick and Nicolaus 1990). Repeated exposures may be necessary to develop and maintain aversion to threatened or endangered species eggs as the learning curve for crows can take from 23 days to 3 months (Dimmick and Nicolaus 1990, Avery and Decker 1994).

Treated areas would be posted with warning signs at access points to exclude people from endangered or threatened species nesting areas. Treated eggs would not be placed in locations where threatened or endangered species may eat the treated eggs. Mesurol is highly toxic to birds and mammals and toxic to fish. It is also highly toxic to honey bees.

Particulate feed additives have been investigated for their bird-repellent characteristics. In pen trials, European starlings rejected grain to which charcoal particles were adhered (L. Clark, NWRC, Pers. Comm. 1999). If further research finds this method to be effective and economical in field application, it may become available as a bird repellent on livestock feed. Charcoal feed additives have been explored for use in reducing methane production in livestock and should have no adverse effects on livestock, on meat or milk production, or on human consumers of meat or dairy products (L. Clark, NWRC, Pers. Comm. 1999).

Other chemical repellents. A number of other chemicals have shown bird repellent capabilities. Anthraquinone, a naturally occurring chemical found in many plant species and in some invertebrates as a natural predator defense mechanism, has shown effectiveness in protecting rice seed from red-winged blackbirds and boat-tailed grackles

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[4] An LD_{50} is the dosage in milligrams of material per kilogram of body weight, or, in this case in micrograms per individual bee, required to cause death in 50% of a test population of a species.

[5] An LC_{50} is the dosage in milligrams of material per liter of air required to cause death in 50% of a test population of a species through inhalation.

(Avery et al. 1997). It has also shown effectiveness as a foraging repellent against Canada geese grazing on turf and as a seed repellent against brown-headed cowbirds (Dolbeer et al. 1998). Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting European starlings (Clark 1997). Naphthalene (moth balls) was found to be ineffective in repelling European starlings (Dolbeer et al. 1988).

Tactile repellents. A number of tactile repellent products are on the market which reportedly deter birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason and Clark 1992). The repellency of tactile products is generally short-lived because dust tends to stick to the product. Additionally, tactile repellents may not be aesthetically pleasing and may require expensive clean-up costs as the material may run down the sides of buildings in hot weather.

Alpha-Chloralose is a central nervous system depressant used as an immobilizing agent to capture and remove nuisance waterfowl and other birds. It is labor intensive and in some cases, may not be cost effective (Wright 1973, Feare et al. 1981), but is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-Chloralose is typically delivered as well contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds. WS personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Alpha-Chloralose was eliminated from more detailed analysis in USDA (1997) based on critical element screening; therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. Alpha-Chloralose is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about two to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Woronecki et al. 1990), but the compound is generally not soluble in water and, therefore, should remain unavailable to aquatic organisms. Factors supporting the determination of this low potential included the lack of exposure to pets, non-target species and the public, and the low toxicity of the active ingredient. Other supporting rationale for this determination included relatively low total annual use and a limited number of potential exposure pathways. The agent is currently approved for use by WS as an Investigative New Animal Drug by the FDA rather than a pesticide.

Egg oiling is a method for suppressing reproduction of nuisance birds by spraying a small quantity of food grade vegetable oil or mineral oil on eggs in nests. The oil prevents exchange of 5gases and causes asphyxiation of developing embryos. It has been found to be 96-100% effective in reducing hatchability (Pochop 1998, Pochop et al. 1998). The method has an advantage over nest or egg destruction in that the incubating birds generally continue incubation and do not renest. The EPA has ruled that use of corn oil for this purpose is exempt from registration requirements under FIFRA. To be most effective, the oil should be applied anytime between the fifth day after the laying of the last egg in a nest and at least five days before anticipated hatching. This method is extremely target specific and is less labor intensive than egg addling.

LETHAL, MECHANICAL METHODS

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large numbers of birds are present. Normally, shooting is conducted with shotguns, rifles, or air rifles. Shooting is a very target-specific method and is normally used to remove a single offending bird. However, at times, a few birds could be shot from a flock to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997). It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with shotguns, air rifles, or rim and center fire rifles is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. WS complies with all firearm safety precautions when conducting BDM activities and all laws and regulations governing the lawful use of firearms are strictly followed.

Firearm use is a very sensitive public concern because of issues relating to public safety and misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved

firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Live traps include (although live traps are non-lethal, birds may be euthanized upon capture):

Decoy traps are used by WS for preventive and corrective damage management. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Decoy traps and other cage/live traps, as applied and used by WS, pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Leghold traps are used by WS for preventative and corrective damage management. Trapping with leghold traps can be effective in areas where a small resident crow population is present (Johnson 1994). Number 0 or 1 leghold traps with padded jaws would be used to trap individual birds in areas habitually used by crows. Traps would be monitored a minimum of twice each day and trapped birds euthanized by methods approved by the AVMA (Beaver et al. 2001) or a veterinarian.

Nest box traps may be used by WS for corrective damage management and are effective in capturing local breeding and post breeding European starlings and other targeted secondary cavity nesting birds (DeHaven and Guarino 1969, Knittle and Guarino 1976). Trapped birds are euthanized. Relocation to other areas following live capture would not generally be effective because problem bird species are highly mobile and can easily return to damage sites from long distances; habitats in other areas are generally already occupied; and relocation would most likely result in bird damage problems at the new location. Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats.

Mist nets are more commonly used for capturing small-sized birds such as English sparrows and finches, but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller nuisance hawks and owls. This method was introduced into the United States in the 1950's from Asia and the Mediterranean where it was used to capture birds for the market (Day et al. 1980). The mist net is a fine black silk or nylon net, usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net.

Cannon nets are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds which have been baited to a particular site. This type of net is especially effective for birds which are typically shy to other types of capture.

Sport hunting is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted. A valid hunting license and other licenses or permits may be required by the NYSDEC and USFWS for certain species. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended for crow damage management around crops or other resources if it can be conducted safely.

Cervical dislocation is sometimes used to euthanize birds which are captured in live traps. The bird is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as humane method of euthanasia and states that cervical dislocation, when properly executed, is a humane technique for euthanasia of poultry and other small birds (Beaver et al. 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al. 2001).

Snap traps are modified rat snap traps used to remove individual woodpeckers, European starlings, and other cavity nesting birds. The trap treadle is baited with peanut butter or other food attractants and attached near the damage

area. These traps pose no imminent danger to pets or the public and are usually located in positions inaccessible to people and most non-avian animals. They are very selective because they are usually set in the defended territory of the target birds.

LETHAL, CHEMICAL METHODS

All restricted-use chemicals used by WS in New York are registered as required by the FIFRA (administered by the EPA). WS personnel who use restricted-use chemical methods are certified as pesticide applicators by the NYSDEC and are required to adhere to all certification requirements set forth in FIFRA and New York pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

CO2 is sometimes used to euthanize birds which are captured in live traps. Live birds are placed in a container such as a plastic 5-gallon bucket or chamber and sealed shut. CO_2 gas is released into the bucket or chamber and birds quickly die after inhaling the gas. This method is approved as a euthanizing agent by the AVMA (Beaver et al. 2001). CO_2 gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of CO_2 by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

Starlicide® (3-chloro-p-toluidine hydrochloride) is a restricted use pesticide that is formulated as a 0.1% ready-to-use product and is commercially available to certified applicators or persons under their supervision. This avicide may be recommended or used by WS to control European starlings, crows, pigeons, cowbirds, grackles, magpies, and certain gull species. Starlicide® may be used in feedlots, around buildings and fenced non-crop areas, bird staging and roosting areas, federal and state wildlife refuges, and other sites (EPA 1995). Starlicide® is similar to DRC-1339 used in feedlots; however, it contains 0.1% DRC-1339 (USDA 1997, Appendix P). Therefore, the properties of this product are similar to DRC-1339 (discussed below).

DRC-1339 (3-chloro-p-toluidine hydrochloride) is a restricted use pesticide and is the principal chemical method that would be used for bird damage management under the Proposed Action. For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull, and pigeon control at feedlots, dairies, airports, and in urban areas (West et al. 1967, Besser et al. 1967, Decino et al. 1966). Studies continue to document the effectiveness of DRC-1339 in resolving blackbird/starling problems at feedlots (West and Besser 1976, Glahn 1982, Glahn et al. 1987) and dispersing crow roosts in urban/suburban areas (Boyd and Hall 1987). Blanton et al. (1992) reports that DRC-1339 appears to be a very effective, selective, and safe means of reducing urban pigeon populations. Glahn and Wilson (1992) noted that baiting with DRC-1339 is a cost-effective method of reducing damage by blackbirds to sprouting rice.

DRC-1339 is a slow acting avicide that is registered with the EPA for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 has several EPA Registration Labels (56228-10, 56228-17, 56228-28, 56228-29, and 56228-30) depending on the application or species involved in the bird damage management project. DRC-1339 was developed as an avicide because of its differential toxicity to mammals. DRC-1339 is highly toxic to sensitive species, but only slightly toxic to non-sensitive birds, predatory birds, and mammals (Johnson et al. 1999, Schafer 1991, 1981). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/bird to cause death (Royall et al. 1967). Most bird species that are responsible for damage, including starlings, blackbirds, pigeons, crows, magpies, and ravens, are highly sensitive to DRC-1339. Many other bird species such as raptors (Schafer 1981), sparrows, and eagles are classified as non-sensitive. Numerous studies show that DRC- 1339 poses minimal risk of primary poisoning to non-target and T&E species (USDA 1997). Secondary poisoning has not been observed with DRC-1339 treated baits, except crows eating gut contents of pigeons (Kreps 1974). During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1981). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and starlings killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost nonexistent (Johnson et al. 1999, Schafer 1991, 1984). DRC-1339 acts in a humane manner producing a quiet and apparently painless death.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. DRC-1339 tightly binds to soil and has low mobility. The half life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (i.e., degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997). Appendix P of USDA (1997) contains a thorough risk assessment of DRC-1339 and the reader is referred to that source for a more complete discussion. That assessment concluded that no adverse effects are expected from use of DRC-1339.

APPENDIX C

SPECIES THAT ARE FEDERALLY LISTED AS THREATENED OR ENDANGERED IN THE STATE OF NEW YORK

Endangered

Birds	
Roseate tern	*Sterna dougallii dougallii*
Eskimo curlew	*Numenius borealis*
Piping plover[i]	*Charadrius melodus*
Mammals	
Indiana bat	*Myotis sodalis*
Sperm whale	*Physeter catodon*
Sei whale	*Balaenoptera borealis*
Blue whale	*Balaenoptera musculus*
Finback whale	*Balaenoptera physalus*
Humpback whale	*Megaptera novaeangliae*
Right whale	*Eubalaena glacialis*
Gray wolf[ii]	*Canis lupus*
Cougar[2]	*Felis concolor*
Reptiles	
Atlantic hawksbill sea turtle	*Eretmochelys imbricata*
Atlantic ridley sea turtle	*Lepidochelys kempii*
Leatherback sea turtle	*Dermochelys coriacea*
Fishes	
Shortnose sturgeon	*Acipenser brevirostrum*
Insects	
Karner blue	*Lycaeides melissa samuelis*
American burying beetle[2]	*Nicrophorus americanus*+
Molluscs	
Dwarf wedgemussel	*Alasmidonta heterodon*
Pink mucket	*Lampsilis abrupta*
Clubshell	*Pleurobema clava*
Fat pocketbook	*Potamilus capax*
Plants	
Gerardia, sandplain	*Agalinis acuta*

Threatened

Birds	
Bald eagle	*Haliaeetus leucocephalus*
Piping plover[1]	*Charadrius melodus*
Mammals	
Canada lynx[2]	*Lynx canadensis*
Reptiles	

Green sea turtle	*Chelonia mydas*
Loggerhead sea turtle	*Caretta caretta*
Bog turtle	*Clemmys muhlenbergii*

Molluscs

Chittenango ovate amber snail	*Novisuccinea chittenangoensis*

Insects

Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*

Plants

Monkshood, northern wild	*Aconitum noveboracense*
Amaranth, seabeach	*Amaranthus pumilus*
Fern, American hart's-tongue	*Asplenium scolopendrium* var. *americanum*
Roseroot, Leedy's	*Sedum integrifolium* ssp. *Leedy*
Goldenrod, Houghton's	*Solidago houghtonii*

APPENDIX D

SPECIES THAT ARE STATE LISTED AS THREATENED, ENDANGERED, OR OF SPECIAL CONCERN IN THE STATE OF NEW YORK

Endangered

Birds	
Roseate tern	*Sterna dougallii dougallii*
Eskimo curlew	*Numenius borealis*
Piping plover	*Charadrius melodus*
Peregrine falcon	*Falco peregrinus*
Spruce grouse	*Falcipennis canadensis*
Black rail	*Laterallus jamaicensis*
Black tern	*Chlidonias niger*
Short-eared owl	*Asio flammeus*
Loggerhead shrike	*Lanius ludovicianus*
Golden eagle[iii]	*Aquila chrysaetos*
Mammals	
Indiana bat	*Myotis sodalis*
Sperm whale	*Physeter catodon*
Sei whale	*Balaenoptera borealis*
Blue whale	*Balaenoptera musculus*
Finback whale	*Balaenoptera physalus*
Humpback whale	*Megaptera novaeangliae*
Right whale	*Eubalaena glacialis*
Gray wolf[1]	*Canis lupus*
Cougar[1]	*Felis concolor*
Allegheny woodrat[1]	*Neotoma magister*
Reptiles	
Atlantic hawksbill sea turtle	*Eretmochelys imbricata*
Atlantic ridley sea turtle	*Lepidochelys kempii*
Leatherback sea turtle	*Dermochelys coriacea*
Mud turtle	*Kinosternon subrubrum*
Bog turtle	*Clemmys muhlengergii*
Queen snake	*Regina septemvittata*
Massasauga	*Sistrurus catenatus*
Amphibians	
Tiger salamander	*Ambystoma tigrinum*
Northern cricket frog	*Acris crepitans*
Fishes	
Shortnose sturgeon	*Acipenser brevirostrum*
Pugnose shiner	*Notropis anogenus*
Round whitefish	*Prosopium cylindraceum*
Bluebreast darter	*Etheostoma camurum*
Deepwater sculpin	*Myoxocephalus thompsoni*
Silver chub[1]	*Macrhybopsis storeriana*
Gilt darter[1]	*Percina evides*
Spoonhead sculpin[1]	*Cottus ricei*

Insects

Karner blue	*Lycaeides melissa samuelis*
Tomah mayfly	*Siphlonisca aerodromia*
Hessel's hairstreak	*Callophrys hesseli*
Regal fritillary	*Speyeria idalia*
Persius duskywing	*Erynnis persius*
Grizzled skipper	*Pyrgus centaureae wyandot*
Arogos skipper	*Atrytone arogos arogos*
Bog buckmoth	*Hemileuca species 1*
Pine pinion moth	*Lithophane lepida lepida*
American burying beetle[1]	*Nicrophorus americanus*

Molluscs

Dwarf wedgemussel	*Alasmidonta heterodon*
Pink mucket	*Lampsilis abrupta*
Clubshell	*Pleurobema clava*
Fat pocketbook	*Potamilus capax*
Rayed bean	*Villosa fabalis*
Chittenango ovate amber snail	*Novisuccinea chittenangoensis*

Plants

Virginia three-seeded mercury	*Acalypha virginica* var. *virginica*
Moschatel	*Adoxa moschatellina*
Sandplain gerardia	*Agalinis acuta*
Wild leek	*Allium burdickii*
Seabeach amaranth	*Amaranthus pumilus*
Nantucket juneberry	*Amelanchier nantucketensis*
Champlain beachgrass	*Ammophila champlainensis*
Peanut grass	*Amphicarpum purshii*
Angelica	*Angelica lucida*
Alpine sweetgrass	*Anthoxanthum monticolum* ssp. *orthanthum*
Puttyroot	*Aplectrum hyemale*
Drummond's rock cress	*Arabis drummondii*
Toothed rock-cress	*Arabis shortii*
Virginia snakeroot	*Aristolochia serpentaria*
Arnica	*Arnica lanceolata*
Wild sage	*Artemisia campestris* var. *borealis*
White milkweed	*Asclepias variegata*
Bradley's spleenwort	*Asplenium bradleyi*
Green spleenwort	*Asplenium trichomanes-ramosum*
Lindley's aster	*Aster ciliolatus*
Silvery aster	*Aster concolor*
Smooth blue aster	*Aster laevis* var. *concinnus*
Tall white aster	*Aster lanceolatus* var. *interior*
Calico aster	*Aster lateriflorus* var. *hirsuticaulis*
Sky-blue aster	*Aster oolentangiensis*
Cornel-leaved aster	*Aster puniceus* var. *firmus*
Swamp aster	*Aster radula*
Cooper's milkvetch	*Astragalus neglectus*
Seaside orach	*Atriplex glabriuscula*
Orache	*Atriplex subspicata*
Screw-stem	*Bartonia paniculata*
Tundra dwarf birch	*Betula glandulosa*
Dwarf white birch	*Betula minor*
Estuary beggar-ticks	*Bidens hyperborea*

Downy wood-mint	*Blephilia ciliata*
Prairie dunewort	*Botrychium campestre*
Moonwort	*Botrychium lunaria*
Mingan moonwort	*Botrychium minganense*
Blunt-lobe grape fern	*Botrychium oneidense*
Rugulose grape fern	*Botrychium rugulosum*
Side-oats grama	*Bouteloua curtipendula*
Blue-hearts	*Buchnera americana*
Sweet-scented Indian-plantain	*Cacalia suaveolens*
Wood reedgrass	*Calamagrostis perplexa*
Porter's reedgrass	*Calamagrostis porteri* ssp. *porteri*
Northern reedgrass	*Calamagrostis stricta* ssp. *stricta*
Autumnal water-starwort	*Callitriche hermaphroditica*
Calypso	*Calypso bulbosa*
Mountain watercress	*Cardamine rotundifolia*
Glomerate sedge	*Carex aggregata*
Narrow-leaved sedge	*Carex amphibola* var. *amphibola*
Northern clustered sedge	*Carex arcta*
Awned sedge	*Carex atherodes*
Black sedge	*Carex atratiformis*
Barratt's sedge	*Carex barrattii*
Button sedge	*Carex bullata*
Hair-like sedge	*Carex capillaris*
Carolina sedge	*Carex caroliniana*
Collins' sedge	*Carex collinsii*
Soft fox sedge	*Carex conjuncta*
Cypress-knee sedge	*Carex decomposita*
Emory's sedge	*Carex emoryi*
Glaucous sedge	*Carex flaccosperma* var. *glaucodea*
Frank's sedge	*Carex frankii*
Elk sedge	*Carex garberi*
Northern bog sedge	*Carex gynocrates*
Cloud sedge	*Carex haydenii*
Loose-flowered sedge	*Carex laxiflora* var. *serrulata*
Livid sedge	*Carex livida* var. *radicaulis*
Mead's sedge	*Carex meadii*
Midland sedge	*Carex mesochorea*
Black sedge	*Carex nigra*
Black-edge sedge	*Carex nigromarginata*
Reflexed sedge	*Carex retroflexa*
Canadian single-spike sedge	*Carex scirpoidea*
Short's sedge	*Carex shortiana*
Straw sedge	*Carex straminea*
Lined sedge	*Carex striatula*
Bent sedge	*Carex styloflexa*
Many-head sedge	*Carex sychnocephala*
Sparse-flowered sedge	*Carex tenuiflora*
Tinged sedge	*Carex tincta*
Sheathed sedge	*Carex vaginata*
Graceful sedge	*Carex venusta* var. *minor*
Wiegand's sedge	*Carex wiegandii*
Scarlet Indian-paintbrush	*Castilleja coccinea*
Prairie redroot	*Ceanothus herbaceus*
Spreading chervil	*Chaerophyllum procumbens*
Slender spikegrass	*Chasmanthium laxum*

Wooly lip-fern	*Cheilanthes lanosa*
Missouri goosefoot	*Chenopodium album* var. *missouriense*
Large calyx goosefoot	*Chenopodium berlandieri* var. *macrocalycium*
Blue-eyed-Mary	*Collinsia verna*
Striped coralroot	*Corallorhiza striata*
Broom crowberry	*Corema conradii*
Rough-leaf dogwood	*Cornus drummondii*
Pigmyweed	*Crassula aquatica*
Hawthorn	*Crataegus berberifolia*
Compact hawthorn	*Crataegus compacta*
Downy hawthorn	*Crataegus mollis*
Dwarf hawthorn	*Crataegus uniflora*
Rattlebox	*Crotalaria sagittalis*
Button-bush dodder	*Cuscuta cephalanthi*
Southern dodder	*Cuscuta obtusiflora* var. *glandulosa*
Smartweed dodder	*Cuscuta polygonorum*
Northern wild comfrey	*Cynoglossum virginianum* var. *boreale*
Wild comfrey	*Cynoglossum virginianum* var. *virginianum*
Globose flatsedge	*Cyperus echinatus*
Yellow flatsedge	*Cyperus flavescens* var. *flavescens*
Coast flatsedge	*Cyperus polystachyos* var. *texensis*
Retrorse flatsedge	*Cyperus retrorsus*
Small white ladyslipper	*Cypripedium candidum*
Small yellow ladyslipper	*Cypripedium parviflorum* var. *parviflorum*
Lowland fragile fern	*Cystopteris protrusa*
Northern tansey-mustard	*Descurainia pinnata* ssp. *brachycarpa*
Spreading tick-clover	*Desmodium humifusum*
Smooth tick-clover	*Desmodium laevigatum*
Nuttall's tick-clover	*Desmodium nuttallii*
Beggar-lice	*Desmodium obtusum*
Small-flowered tick-clover	*Desmodium pauciflorum*
Beakgrass	*Diarrhena obovata*
Salt-meadow grass	*Diplachne maritimea*
Rock-cress	*Draba glabella*
American dragonhead	*Dracocephalum parviflorum*
Log fern	*Dryopteris celsa*
Fragrant cliff fern	*Dryopteris fragrans*
Yerba-de-tago	*Eclipta prostrata*
American waterwort	*Elatine americana*
Slender spikerush	*Eleocharis elliptica* var. *pseudoptera*
Engelmann's spikerush	*Eleocharis engelmannii*
Creeping spikerush	*Eleocharis fallax*
Blunt spikerush	*Eleocharis obtusa* var. *ovata*
Angled spikerush	*Eleocharis quadrangulata*
Three-ribbed spikerush	*Eleocharis tricostata*
Purple crowberry	*Empetrum eamesii* ssp. *atropurpureum*
Willow-herb	*Epilobium ciliatum* ssp. *glandulosum*
Alpine willow-herb	*Epilobium hornemannii*
Smooth scouring rush	*Equisetum laevigatum*
Fireweed	*Erechtites hieraciifolia* var. *megalocarpa*
Harbinger-of-spring	*Erigenia bulbosa*
Daisy fleabane	*Erigeron hyssopifolius*
Narrow-leaf cottongrass	*Eriophorum angustifolium* ssp. *scabriusculum*
American strawberry-bush	*Euonymus americana*
Small white snakeroot	*Eupatorium aromaticum*

White boneset	*Eupatorium leucolepis* var. *leucolepis*
Round-leaf boneset	*Eupatorium rotundifolium* var. *ovatum*
Round-leaf boneset	*Eupatorium rotundifolium* var. *rotundifolium*
Late boneset	*Eupatorium serotinum*
Ipecac spurge	*Euphorbia ipecacuanhae*
Sheep fescue	*Festuca saximontana*
Shining bedstraw	*Galium concinnum*
Northern wild-licorice	*Galium kamtschaticum*
Dwarf huckleberry	*Gaylussacia dumosa* var. *bigeloviana*
Soapwort gentian	*Gentiana saponaria*
Lesser fringed gentian	*Gentianopsis procera*
Purple comandra	*Geocaulon lividum*
Spring avens	*Geum vernum*
Rough avens	*Geum virginianum*
Catfoot	*Gnaphalium helleri* var. *micradenium*
Purple everlasting	*Gnaphalium purpureum*
Woodland cudweed	*Gnaphalium sylvaticum*
Kentucky coffee tree	*Gymnocladus dioica*
Northern stickseed	*Hackelia deflexa* var. *americana*
Spurred gentian	*Halenia deflexa*
Mare's-tail	*Hippuris vulgaris*
Purple bluets	*Houstonia purpurea* var. *calycosa*
Purple bluets	*Houstonia purpurea* var. *purpurea*
Fir clubmoss	*Huperzia selago*
Wild hydrangea	*Hydrangea arborescens*
Floating pennywort	*Hydrocotyle ranunculoides*
Water-pennywort	*Hydrocotyle verticillata*
Creeping St. John's-wort	*Hypericum adpressum*
Bushy St. John's-wort	*Hypericum densiflorum*
Coppery St. John's-wort	*Hypericum denticulatum*
St. Andrew's cross	*Hypericum hypercoides* ssp. *multicaule*
Wild potato-vine	*Ipomoea pandurata*
Southern blueflag	*Iris virginica* var. *schrevei*
Quillwort	*Isoetes riparia*
Small whorled pogonia	*Isotria medeoloides*
Doubtful toad-rush	*Juncus ambiguus*
Short-fruit rush	*Juncus brachycarpus*
Weak rush	*Juncus debilis*
Ensiform rush	*Juncus ensifolius*
Large grass-leaved rush	*Juncus marginatus* var. *biflorus*
Scirpus-like rush	*Juncus scirpoides*
Moor-rush	*Juncus stygius* ssp. *americanus*
Woods-rush	*Juncus subcaudatus*
Prostrate juniper	*Juniperus horizontalis*
Carolina redroot	*Lachnanthes caroliniana*
False lettuce	*Lactuca floridana*
Downy lettuce	*Lactuca hirsuta*
Rough veiny vetchling	*Lathyrus venosus*
Bead pinweed	*Lechea pulchella* var. *moniliformis*
Minute duckweed	*Lemna perpusilla*
Pale duckweed	*Lemna valdiviana*
Leucospora	*Leucospora multifida*
Slender blazing-star	*Liatris cylindracea*
Scotch lovage	*Ligusticum scothicum*
Michigan lily	*Lilium michiganense*

Wild flax	*Linum medium* var. *medium*
Large twayblade	*Liparis lilifolia*
Dwarf bulrush	*Lipocarpha micrantha*
Auricled twayblade	*Listera auriculata*
Southern twayblade	*Listera australis*
Broad-lipped twayblade	*Listera convallarioides*
Golden puccoon	*Lithospermum caroliniense* ssp. *croceum*
American shore-grass	*Littorella uniflora*
Alpine azalea	*Loiseleuria procumbens*
Spiked woodthrush	*Luzula spicata*
Carolina clubmoss	*Lycopodiella caroliniana*
Northern running-pine	*Lycopodium complanatum*
Sitka clubmoss	*Lycopodium sitchense*
Gypsy-wort	*Lycopus rubellus*
Climbing fern	*Lygodium palmatum*
Lance-leaved loosestrife	*Lysimachia hybrida*
Four-flowered loosestrife	*Lysimachia quadriflora*
Saltmarsh loosestrife	*Lythrum lineare*
Sweetbay magnolia	*Magnolia virginiana*
Bayard's malaxis	*Malaxis bayardii*
American crab	*Malus glaucescens*
Virginia bunchflower	*Melanthium virginicum*
Basil-balm	*Monarda clinopodia*
Green parrot's-feather	*Myriophyllum pinnatum*
Muenscher's naiad	*Najas guadalupensis* var. *muenscheri*
Southern naiad	*Najas guadalupensis* var. *olivacea*
Holly-leaved naiad	*Najas marina*
Cut-leaved evening-primrose	*Oenothera laciniata*
Clustered bluets	*Oldenlandia uniflora*
Virginia false gromwell	*Onosmodium virginianum*
Canada ricegrass	*Oryzopsis canadensis*
Stiff cowbane	*Oxypolis rigidior*
Leiberg's panic grass	*Panicum leibergii*
Few-flowered panic grass	*Panicum oligosanthes* var. *oligosanthes*
Panic grass	*Panicum scabriusculum*
Velvet panic grass	*Panicum scoparium*
Tall flat panic grass	*Panicum stipitatum*
Wright's panic grass	*Panicum wrightianum*
Round field beadgrass	*Paspalum laeve* var. *circulare*
Hairy field beadgrass	*Paspalum laeve* var. *pilosum*
Slender beadgrass	*Paspalum setaceum* var. *psammophilum*
Sweet coltsfoot	*Petasites frigidus* var. *palmatus*
Wild sweet-William	*Phlox maculata*
Downy phlox	*Phlox pilosa*
Ground-cherry	*Physalis pubescens* var. *integrifolia*
Virginia ground-cherry	*Physalis virginiana*
Ninebark	*Physocarpus opulifolius* var. *intermedius*
Virginia pine	*Pinus virginiana*
Orange fringed orchis	*Platanthera ciliaris*
Crested fringed orchis	*Platanthera cristata*
Hooker's orchid	*Platanthera hookeri*
Prairie fringed orchid	*Platanthera leucophaea*
Bluegrass	*Poa cuspidata*
Fernald bluegrass	*Poa fernaldiana*
White bluegrass	*Poa glauca*

Inland bluegrass	*Poa interior*
Slender marsh bluegrass	*Poa paludigena*
Woodland bluegrass	*Poa sylvestris*
Yellow milkwort	*Polygala lutea*
Small's knotweed	*Polygonum buxiforme*
Erect knotweed	*Polygonum erectum*
Swamp smartweed	*Polygonum setaceum* var. *interjectum*
Bear's-foot	*Polymnia uvedalia*
Northern holly-fern	*Polystichum lonchitis*
Water-thread pondweed	*Potamogeton diversifolius*
Slender pondweed	*Potamogeton filiformis* var. *alpinus*
Sheathed pondweed	*Potamogeton filiformis* var. *occidentalis*
Ogden's pondweed	*Potamogeton ogdenii*
Straight-leaf pondweed	*Potamogeton strictifolius*
Bushy cinquefoil	*Potentilla paradoxa*
Boott's rattlesnake-root	*Prenanthes boottii*
Nodding rattlesnake-root	*Prenanthes crepidinea*
Dwarf rattlesnake-root	*Prenanthes nana*
Low sand-cherry	*Prunus pumila* var. *pumila*
Wafer-ash	*Ptelea trifoliata*
Giant pine-drops	*Pterospora andromedea*
Mountain-mint	*Pycnanthemum clinopodioides*
Torrey's mountain-mint	*Pycnanthemum torrei*
Whorled mountain-mint	*Pycnanthemum verticillatum* var. *pilosum*
Mountain pyrola	*Pyrola minor*
Pixies	*Pyxidanthera barbulata*
Willow oak	*Quercus phellos*
Seaside crowfoot	*Ranunculus cymbalaria*
Swamp buttercup	*Ranunculus hispidus* var. *nitidus*
Lapland rosebay	*Rhododendron lapponicum*
Torrey's beakrush	*Rhynchospora torreyana*
Prickly rose	*Rosa acicularis* ssp. *sayi*
Shining rose	*Rosa nitida*
Sand blackberry	*Rubus cuneifolius*
Black-eyed-susan	*Rudbeckia hirta* var. *hirta*
Heart sorrel	*Rumex hastatulus*
Golden dock	*Rumex maritimus* var. *fueginus*
Rose-pink	*Sabatia angularis*
Slender marsh-pink	*Sabatia campanulata*
Small-flowered pearlwort	*Sagina decumbens*
Quill-leaf arrowhead	*Sagittaria teres*
Sand dune willow	*Salix cordata*
Dwarf willow	*Salix herbacea*
Lyre-leaf sage	*Salvia lyrata*
Purple mountain-saxifrage	*Saxifraga oppositifolia*
White mountain-saxifrage	*Saxifraga paniculata*
Curlygrass	*Schizaea pusilla*
Clinton's clubrush	*Scirpus clintonii*
Georgia bulrush	*Scirpus georgianus*
Slender bulrush	*Scirpus heterochaetus*
Seaside bulrush	*Scirpus maritimus*
Saltmarsh bulrush	*Scirpus novae-angliae*
Slender nutrush	*Scleria minor*
Fewflower nutrush	*Scleria pauciflora* var. *caroliniana*
Reticulate nutrush	*Scleria reticularis* var. *pubescens*

Low nutrush	*Scleria verticillata*
Hoary skullcap	*Scutellaria incana*
Hyssop-skullcap	*Scutellaria integrifolia*
Leedy's roseroot	*Sedum integrifolium* ssp. *leedyi*
Roseroot	*Sedum rosea*
Live-forever	*Sedum telephioides*
Sea purslane	*Sesuvium maritimum*
Michaux's blue-eyed-grass	*Sisyrinchium mucronatum*
False china-root	*Smilax pseudo-china*
Jacob's-ladder	*Smilax pulverulenta*
Coastal goldenrod	*Solidago elliottii*
Houghton's goldenrod	*Solidago houghtonii*
Rough goldenrod	*Solidago rugosa* ssp. *aspera*
Tall hairy goldenrod	*Solidago rugosa* var. *sphagnophila*
Seaside goldenrod	*Solidago sempervirens* var. *mexicana*
Mountain goldenrod	*Solidago simplex* var. *racemosa*
Prairie wedgegrass	*Sphenopholis obtusata* var. *obtusata*
Swamp oats	*Sphenopholis pensylvanica*
Mountain meadowsweet	*Spiraea septentrionalis*
Spring ladies'-tresses	*Spiranthes vernalis*
Rough rush-grass	*Sporobolus clandestinus*
Pink wild bean	*Strophostyles umbellata*
Narrow-leaf sea-blite	*Suaeda linearis*
Roland's sea-blite	*Suaeda rolandii*
Water awlwort	*Subularia aquatica* var. *americana*
Veiny meadow-rue	*Thalictrum venulosum*
Cranefly orchid	*Tipularia discolor*
Sticky false asphodel	*Tofieldia glutinosa*
Filmy fern	*Trichomanes intricatum*
Tiny blue-curls	*Trichostema setaceum*
Nodding trillium	*Trillium flexipes*
Toad-shade	*Trillium sessile*
Nodding pogonia	*Triphora trianthophora*
Melic-oats	*Trisetum melicoides*
Large floating bladderwort	*Utricularia inflata*
Mountain bellwort	*Uvularia puberula* var. *nitida*
Dwarf blueberry	*Vaccinium cespitosum*
Marsh valerian	*Valeriana uliginosa*
Goosefoot corn-salad	*Valerianella chenopodiifolia*
Corn-salad	*Valerianella umbilicata*
Tall ironweed	*Vernonia gigantea*
Possum-haw	*Viburnum nudum* var. *nudum*
Coastal violet	*Viola brittoniana* var. *brittoniana*
Southern wood violet	*Viola hirsutula*
Northern bog violet	*Viola nephrophylla*
New England violet	*Viola novae-angliae*
Winter grape	*Vitis vulpina*
Appalachian vittaria	*Vittaria appalachiana*
Alpine woodsia	*Woodsia alpina*
Smooth woodsia	*Woodsia glabella*

Threatened

Birds

Bald eagle	*Haliaeetus leucocephalus*

Pied-billed grebe	*Podilymbus podiceps*
Least bittern	*Ixobrychus exilis*
Northern harrier	*Circus cyaneus*
King rail	*Rallus elegans*
Upland sandpiper	*Bartramia longicauda*
Common tern	*Sterna hirundo*
Least tern	*Sterna antillarum*
Sedge wren	*Cistothorus platensis*
Henslow's sparrow	*Ammodramus henslowii*
Mammals	
Canada lynx[1]	*Lynx canadensis*
Reptiles	
Green sea turtle	*Chelonia mydas*
Loggerhead sea turtle	*Caretta caretta*
Blanding's turtle	*Emydoidea blandingii*
Fence lizard	*Sceloporus undulatus*
Timber rattlesnake	*Crotalus horridus*
Fishes	
Lake sturgeon	*Acipenser fulvescens*
Mooneye	*Hiodon tergisus*
Gravel chub	*Erimyzon x-punctata*
Banded sunfish	*Enneacanthus obesus*
Longear sunfish	*Lepomis megalotis*
Longhead darter	*Percina macrocephala*
Eastern sand darter	*Ammocrypta pellucida*
Swamp darter	*Etheostoma fusiforme*
Spotted darter	*Etheostoma maculatum*
Lake chubsucker[1]	*Erimyzon sucetta*
Mud sunfish[1]	*Acantharchus pomotis*
Insects	
Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*
Pine barrens bluet	*Enallagma recurvatum*
Scarlet bluet	*Enallagma pictum*
Little bluet	*Enallagma minisculum*
Frosted elfin	*Callophrys irus*
Molluscs	
Brook floater	*Alasmidonta varicosa*
Wavy-rayed lampmussel	*Lampsilis fasciola*
Green floater	*Lasmigona subviridis*
Plants	
Northern monk's-hood	*Aconitum noveboracense*
Northern gerardia	*Agalinis paupercula var. borealis*
Yellow giant-hyssop	*Agastache nepetoides*
Wodland agrimony	*Agrimonia rostellata*
Northern bentgrass	*Agrostis mertensii*
Stargrass	*Aletris farinosa*
Wild onion	*Allium cernuum*
Green rock-cress	*Arabis missouriensis*
Swamp pink	*Arethusa bulbosa*

Green milkweed	*Asclepias viridiflora*
Pawpaw	*Asimina triloba*
Mountain spleenwort	*Asplenium montanum*
Hart's-tongue fern	*Asplenium scolopendrium* var. *americanum*
Rush aster	*Aster borealis*
Heath aster	*Aster pilosis* var. *pringlei*
Flax-leaf whitetop	*Aster solidagineus*
Showy aster	*Aster spectabilis*
Saltmarsh aster	*Aster subulatus*
Swamp birch	*Betula pumila*
Smooth bur-marigold	*Bidens laevis*
Northern reedgrass	*Calamagrostis stricta* ssp. *inexpansa*
Terrestrial starwort	*Callitriche terrestris*
Long's bittercress	*Cardamine longii*
Thicket sedge	*Carex abscondita*
Rocky mountain sedge	*Carex backii*
Bicknell's sedge	*Carex bicknellii*
Bigelow's sedge	*Carex bigelowii*
Brown bog sedge	*Carex buxbaumii*
Creeping sedge	*Carex chordorrhiza*
Crawe's sedge	*Carex crawei*
Clustered sedge	*Carex cumulata*
Davis' sedge	*Carex davisii*
Handsome sedge	*Carex formosa*
Hitchcock's sedge	*Carex hitchcockiana*
Marsh straw sedge	*Carex hormathodes*
Houghton's sedge	*Carex houghtoniana*
Nebraska sedge	*Carex jamesii*
Fernald's sedge	*Carex merritt-fernaldii*
Mitchell's sedge	*Carex mitchelliana*
Troublesome sedge	*Carex molesta*
Sartwell's sedge	*Carex sartwellii*
Sedge	*Carex schweinitzii*
Weak stellate sedge	*Carex seorsa*
Cat-tail sedge	*Carex typhina*
Willdenow's sedge	*Carex willdenowii*
Big shellbark hickory	*Carya laciniosa*
Dune sandspur	*Cenchrus tribuloides*
Prickly hornwort	*Ceratophyllum echinatum*
Blazing-star	*Chamaelirium luteum*
Red pigweed	*Chenopodium rubrum*
Golden corydalis	*Corydalis aurea*
Hop sedge	*Cyperus lupulinus* ssp. *lupulinus*
Ram's-head ladyslipper	*Cypripedium arietinum*
Little-leaf tick-trefoil	*Desmodium ciliare*
Diapensia	*Diapensia lapponica*
Slender crabgrass	*Digitaria filiformis*
Persimmon	*Diospyros virginiana*
Rock-cress	*Draba arabisans*
Carolina whitlow-grass	*Draba reptans*
Knotted spikerush	*Eleocharis equisetoides*
Salt-marsh spikerush	*Eleocharis halophila*
Long-tubercled spikerush	*Eleocharis tuberculosa*
Meadow horsetail	*Equisetum pratense*
Marsh horsetail	*Equisetum palustre*

White boneset	*Eupatorium album* var. *subvenosum*
Fringed boneset	*Eupatorium hyssopifolium* var. *laciniatum*
Marsh fimbry	*Fimbristylis castanea*
Green gentian	*Frasera caroliniensis*
Carolina cranesbill	*Geranium carolinianum* var. *sphaerospermum*
Prairie-smoke	*Geum triflorum*
Mock-pennyroyal	*Hedeoma hispidum*
Bushy rockrose	*Helianthemum dumosum*
Swamp sunflower	*Helianthus angustifolius*
Featherfoil	*Hottonia inflata*
Appalachian firmoss	*Huperzia appalachiana*
Golden-seal	*Hydrastis canadensis*
Shrubby St. John's-wort	*Hypericum prolificum*
Slender blue flag	*Iris prismatica*
Twin-leaf	*Jeffersonia diphylla*
Arctic rush	*Juncus trifidus*
Slender pinweed	*Lechea tenuifolia*
Velvety lespedeza	*Lespedeza stuevei*
Northern blazing-star	*Liatris borealis*
Lilaeopsis	*Lilaeopsis chinensis*
Sandplain wild flax	*Linum intercursum*
Southern yellow flax	*Linum medium* var. *texanum*
Yellow wild flax	*Linum sulcatum*
Globe-fruited ludwigia	*Ludwigia sphaerocarpa*
Water-marigold	*Megalodonta beckii* var. *beckii*
Appalachian sandwort	*Minuartia glabra*
Water milfoil	*Myriophyllum alterniflorum*
Farwell's water milfoil	*Myriophyllum farwellii*
Evening primrose	*Oenothera parviflora* var. *oakesiana*
Golden club	*Orontium aquaticum*
Violet wood-sorrel	*Oxalis violacea*
Wiry panic grass	*Panicum flexile*
Slender beadgrass	*Paspalum setaceum* var. *setaceum*
Swamp lousewort	*Pedicularis lanceolata*
Smooth cliff brake	*Pellaea glabella*
Butterwort	*Pinguicula vulgaris*
Heartleaf plantain	*Plantago cordata*
Seaside plantain	*Plantago maritima* ssp. *juncoides*
Riverweed	*Podostemum ceratophyllum*
Carey's smartweed	*Polygonum careyi*
Douglas knotweed	*Polygonum douglassii*
Opelousa smartweed	*Polygonum hydropiperoides* var. *opelousanum*
Swamp cottonwood	*Populus heterophylla*
Northern pondweed	*Potamogeton alpinus*
Algae-like pondweed	*Potamogeton confervoides*
Hill's pondweed	*Potamogeton hillii*
Spotted pondweed	*Potamogeton pulcher*
Silverweed	*Potentilla anserina* ssp. *egedii*
Bird's-eye primrose	*Primula mistassinica*
Comb-leaved mermaid-weed	*Proserpinaca pectinata*
Dwarf sand-cherry	*Prunus pumila* var. *depressa*
Blunt mountain-mint	*Pycnanthemum muticum*
Whorled mountain-mint	*Pycnanthemum verticillatum* var. *verticillatum*
Pink wintergreen	*Pyrola asarifolia*
Small-flowered crowfoot	*Ranunculus micranthus*

Rhodora	*Rhododendron canadense*
Drowned horned bush	*Rhynchospora inundata*
Short-beaked bald-rush	*Rhynchospora nitens*
Lake-cress	*Rorippa aquatica*
Tooth-cup	*Rotala ramosior*
Sea-pink	*Sabatia stellaris*
Spongy arrowhead	*Sagittaria calycina* var. *spongiosa*
Dwarf glasswort	*Salicornia bigelovii*
Balsam willow	*Salix pyrifolia*
Bearberry willow	*Salix uva-ursi*
Yellow mountain-saxifrage	*Saxifraga aizoides*
Deer's hair sedge	*Scirpus cespitosus*
Whip nutrush	*Scleria triglomerata*
Alpine goldenrod	*Solidago multiradiata* var. *arctica*
Ohio goldenrod	*Solidago ohioensis*
Stiff-leaf goldenrod	*Solidago rigida*
Mountain goldenrod	*Solidago simplex* var. *randii*
Small bur-reed	*Sparganium nutans*
Northern dropseed	*Sporobolus heterolepis*
Rough hedge-nettle	*Stachys hyssopifolia*
Starwort	*Stellaria longipes*
Marsh arrow-grass	*Triglochin palustre*
Northern gamma grass	*Tripsacum dactyloides*
Cork elm	*Ulmus thomasii*
Rush bladderwort	*Utricularia juncea*
Lesser bladderwort	*Utricularia minor*
Small floating bladderwort	*Utricularia radiata*
Bladderwort	*Utricularia striata*
High-mountain blueberry	*Vaccinium boreale*
Wingstem	*Verbesina alternifolia*
Culver's root	*Veronicastrum virginicum*
Southern arrowwood	*Viburnum dentatum* var. *venosum*
Squashberry	*Viburnum edule*
Primrose violet	*Viola primulifolia*
White camas	*Zigadenus elegans* ssp. *glaucus*

Special Concern

Birds

Common loon	*Gavia immer*
American bittern	*Botaurus lentiginosus*
Osprey	*Pandion haliaetus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
Northern goshawk	*Accipiter gentilis*
Red-shouldered hawk	*Buteo lineatus*
Black skimmer	*Rynchops niger*
Common nighthawk	*Chordeilus minor*
Whip-poor-will	*Caprimulgus vociferus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Horned lark	*Eremophila alpestris*
Bicknell's thrush	*Catharus bicknelli*
Golden-winged warbler	*Vermivora chrysoptera*
Cerulean warbler	*Dendroica cerulea*
Yellow-breasted chat	*Icteria virens*

Vesper sparrow	*Pooecetes gramineus*
Grasshopper sparrow	*Ammodramus savannarum*
Seaside sparrow	*Ammodramus maritimus*
Mammals	
Small-footed bat	*Myotis leibii*
New England cottontail	*Sylvilagus transitionalis*
Harbor porpoise	*Phocoena phocoena*
Reptiles	
Spotted turtle	*Clemmys guttata*
Wood turtle	*Clemmys insculpta*
Eastern box turtle	*Terrapene carolina*
Eastern spiny softshell	*Apalone spinifera*
Eastern hognose snake	*Heterodon platyrhinos*
Worm snake	*Carphophis amoenus*
Amphibians	
Hellbender	*Cryptobranchus alleganiensis*
Marbled salamander	*Ambystoma opacum*
Jefferson salamander	*Ambystoma jeffersonianum*
Blue-spotted salamander	*Ambystoma laterale*
Longtail salamander	*Eurycea longicauda*
Eastern spadefoot toad	*Scaphiopus holbrookii*
Southern leopard frog	*Rana sphenocephala utricularius*
Fishes	
Mountain brook lamprey	*Ichthyomyzon greeleyi*
Black redhorse	*Moxostoma duquesnei*
Streamline chub	*Erymystax dissimilis*
Redfin shiner	*Lythrurus umbratilis*
Ironcolor shiner	*Notropis chalybaeus*
Insects	
Unnamed dragonfly species	*Gomphus spec. nov.*
Southern sprite	*Nehalennia integricollis*
Extra striped snaketail	*Ophiogomphus anomalus*
Pygmy snaketail	*Ophiogomphus howei*
Common sanddragon	*Progomphus obscurus*
Gray petaltail	*Tachopteryx thoreyi*
Checkered white	*Pontia protodice*
Olympia marble	*Euchloe olympia*
Henry's elfin	*Callophrys henrici*
Tawny crescent	*Phyciodes batesii*
Mottled duskywing	*Erynnis martialis*
Barrens buckmoth	*Hemileuca maia*
Herodias underwing	*Catocala herodias gerhardi*
Jair underwing	*Catocala jair*
A noctuid moth	*Heterocampa varia*
Molluscs	
Buffalo pebble snail	*Gillia altilis*
Fringed valvata	*Valvata lewisi*
Mossy valvata	*Valvata sincera*

Plants

Fascicled gerardia	*Agalinis fasciculata*
Estuary beggar-ticks	*Bidens bidentoides*
False hop sedge	*Carex lupuliformis*
Atlantic white-cedar	*Chamaecyparis thyoides*
Rose coreopsis	*Coreopsis rosea*
Schweinitz's flatsedge	*Cyperus schweinitzii*
Dewthread	*Drosera filiformis*
Black crowberry	*Empetrum nigrum* ssp. *hermaphroditicum*
Dwarf umbrella-sedge	*Fuirena pumila*
Large-spored quillwort	*Isoetes lacustris*
Illinois pinweed	*Lechea racemulosa*
Bush clover	*Lespedeza angustifolia*
Trailing lespedeza	*Lespedeza repens*
Violet lespedeza	*Lespedeza violacea*
Mudwort	*Limosella australis*
Stiff yellow flax	*Linum striatum*
Nuttall's lobelia	*Lobelia nuttallii*
Winged monkeyflower	*Mimulus alatus*
Pine-barren sandwort	*Minuartia caroliniana*
Jack pine	*Pinus banksiana*
Jacob's-ladder	*Polemonium vanbruntiae*
Seabeach knotweed	*Polygonum glaucum*
Slender knotweed	*Polygonum tenue*
Long-beaked bald-rush	*Rhynchospora scirpoides*
Pod grass	*Scheuchzeria palustris*
Spreading globeflower	*Trollius laxus* ssp. *laxus*
Bog bilberry	*Vaccinium uliginosum*
White baneberry	*Actaea pachypoda*
Red baneberry	*Actaea spicata* ssp. *rubra*
Green dragon	*Arisaema dracontium*
Nutterfly-weed	*Asclepias tuberosa*
Harebell	*Campanula rotundifolia*
American bittersweet	*Celastrus scandens*
Turtle-heads	*Chelone glabra*
Spotted wintergreen	*Chimaphila maculata*
Pipsissewa	*Chimaphila umbellata*
Speckled woodlily	*Clintonia umbellulata*
Squawroot	*Conopholis americana*
Flowering dogwood	*Cornus florida*
Sundew	*Drosera intermedia*
Sundew	*Drosera rotundifolia*
Trailing arbutus	*Epigaea repens*
Running strawberry-bush	*Euonymus obovata*
Closed gentian	*Gentiana andrewsii*
Blind gentian	*Gentiana clausa*
Closed gentian	*Gentiana linearis*
Stiff gentian	*Gentianella quinquefolia*
Fringed gentian	*Gentianopsis crinita*
Gallberry	*Ilex glabra*
Smooth winterberry	*Ilex laevigata*
Mountain winterberry	*Ilex montana*
American holly	*Ilex opaca*
Black alder	*Ilex verticillata*
Butternut	*Juglans cinerea*

Sheep laurel	*Kalmia angustifolia*
Mountain laurel	*Kalmia latifolia*
Nog laurel	*Kalmia polifolia*
Canada lily	*Lilium canadense*
Woodlily	*Lilium philadelphicum*
Turk's-cap lily	*Lilium superbum*
Sea lavender	*Limonium carolinianum*
Cardinal-flower	*Lobelia cardinalis*
Water lobelia	*Lobelia dortmanna*
Great lobelia	*Lobelia siphilitica*
Virginia bluebells	*Mertensia virginica*
Bee-balm	*Monarda didyma*
Bayberry	*Myrica pensylvanica*
Eastern prickly pear	*Opuntia humifusa*
Ginseng	*Panax quinquefolius*
Grass-of-Parnassus	*Parnassia glauca*
Smooth azalea	*Rhododendron arborescens*
Great laurel	*Rhododendron maximum*
Pinkster	*Rhododendron periclymenoides*
Early azalea	*Rhododendron prinophyllum*
Swamp azalea	*Rhododendron viscosum*
Bloodroot	*Sanguinaria canadensis*
Pitcher-plant	*Sarracenia purpurea*
Wild pink	*Silene caroliniana*
Nodding trillium	*Trillium cernuum*
Purple trillium	*Trillium erectum*
White trillium	*Trillium grandiflorum*
Painted trillium	*Trillium undulatum*
Bird's-foot violet	*Viola pedata*

Clubmosses

Shining firmoss	*Huperzia lucidula*
Foxtail clubmoss	*Lycopodiella alopecuroides*
Swamp clubmoss	*Lycopodiella appressa*
Northern bog clubmoss	*Lycopodiella inundata*
Bristly clubmoss	*Lycopodium annotinum*
Running cedar	*Lycopodium clavatum*
Northern tree clubmoss	*Lycopodium dendroideum*
Running-pine	*Lycopodium digitatum*
Ground pine	*Lycopodium obscurum*
Ground cedar	*Lycopodium tristachyum*

Native Ferns

Maidenhair fern	*Adiantum pedatum*
Ebony spleenwort	*Asplenium platyneuron*
Walking fern	*Asplenium rhizophyllum*
Wall-rue spleenwort	*Asplenium ruta-muraria*
Maidenhair spleenwort	*Asplenium trichomanes*
Lady fern	*Athyrium filix-femina*
Mosquito-fern	*Azolla caroliniana*
Cut-leaf grape fern	*Botrychium dissectum*
Lance-leaf grape fern	*Botrychium lanceolatum*
Matricary grape fern	*Botrychium matricariifolium*
Leathery grape fern	*Botrychium multifidum*
Least moonwort	*Botrychium simplex*

Rattlesnake fern	*Botrychium virginianum*
Slender cliff brake	*Cryptogramma stelleri*
Bulblet fern	*Cystopteris bulbifera*
Common fragile fern	*Cystopteris fragilis*
Fragile fern	*Cystopteris tenuis*
Silvery spleenwort	*Deparia acrostichoides*
Glade fern	*Diplazium pycnocarpon*
Mountain wood fern	*Dryopteris campyloptera*
Spinulose wood fern	*Dryopteris carthusiana*
Clinton's shield fern	*Dryopteris clintoniana*
Crested wood fern	*Dryopteris cristata*
Giant wood fern	*Dryopteris goldiana*
Common wood fern	*Dryopteris intermedia*
Marginal wood fern	*Dryopteris marginalis*
Oak fern	*Gymnocarpium dryopteris*
Ostrich fern	*Matteuccia struthiopteris*
Adder's-tongue	*Ophioglossum pusillum*
Cinnamon fern	*Osmunda cinnamomea*
Interrupted fern	*Osmunda claytoniana*
Royal fern	*Osmunda regalis*
Purple cliff brake	*Pellaea atropurpurea*
Northern beech fern	*Phegopteris connectilis*
Broad beech fern	*Phegopteris hexagonoptera*
Rock polypody	*Polypodium virginianum*
Christmas fern	*Polystichum acrostichoides*
Braun's holly fern	*Polystichum braunii*
Water-fern	*Salvinia minima*
New York fern	*Thelypteris noveboracensis*
Marsh fern	*Thelypteris palustris*
Massachusetts fern	*Thelypteris simulata*
Rusty woodsia	*Woodsia ilvensis*
Blunt-lobed woodsia	*Woodsia obtusa*
Netted chain fern	*Woodwardia areolata*
Virginia chain fern	*Woodwardia virginica*

Native Orchids

Grass pink	*Calopogon tuberosus*
Long-bracted orchid	*Coeloglossum viride*
Spotted coralroot	*Corallorhiza maculata*
Autumn coralroot	*Corallorhiza odontorhiza*
Pink ladyslipper	*Cypripedium acaule*
Small yellow ladyslipper	*Cypripedium parviflorium* var. *makasin*
Yellow ladyslipper	*Cypripedium parviflorium* var. *pubescens*
Showy ladyslipper	*Cypripedium reginae*
Showy orchis	*Galearis spectabilis*
Downy rattlesnake-plantain	*Goodyera pubescens*
Dwarf rattlesnake-plantain	*Goodyera repens*
Rattlesnake-plantain	*Goodyera tesselata*
Large whorled pogonia	*Isotria verticillata*
Bog twayblade	*Liparis loeselii*
Heartleaf twayblade	*Listera cordata*
White adder's-mouth	*Malaxis monophyllos*
Green adder's-mouth	*Malaxis unifolia*
Northern green orchid	*Platanthera aquilonis*
White fringed orchid	*Platanthera blephariglottis*

Green woodland orchid	*Platanthera clavellata*
Bog-candle	*Platanthera dilatata*
Tubercled orchid	*Platanthera flava*
Large purple fringed orchid	*Platanthera grandiflora*
Tall Northern green orchid	*Platanthera huronensis*
Ragged fringed orchid	*Platanthera lacera*
Blunt-leaved orchid	*Platanthera obtusata*
Large round-leaved orchid	*Platanthera orbiculata*
Small purple fringed orchid	*Platanthera psycodes*
Rose pogonia	*Pogonia ophioglossoides*
Lady's-tresses	*Spiranthes casei*
Nodding lady's-tresses	*Spiranthes cernua*
Slender lady's-tresses	*Spiranthes lacera*
Wide-leaved lady's-tresses	*Spiranthes lucida*
Creamy lady's-tresses	*Spiranthes ochroleuca*
Hooded lady's-tresses	*Spiranthes romanzoffiana*
Little lady's-tresses	*Spiranthes tuberosa*

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[i] The piping plover is listed as federally endangered in the Great Lakes Region, and as federally threatened in the Atlantic Coastal Region.

[ii] Extirpated – species is not extinct, but no longer occurring in a wild state within New York, or no longer exhibiting patterns of use traditional for that species in New York.

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